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TROY ASBESTOS PROPERTY EVALUATION WORK PLAN
(FIELD SAMPLING PLAN AND QUALITY ASSURANCE PROJECT PLAN)

FOR THE

TROY ASBESTOS PROPERTY EVALUATION PROJECT

Troy Operable Unit Number 7
of the Libby Asbestos Superfund Site

July 9, 2007

Prepared for:

MONTANA DEPARTMENT OF ENVIRONMENTAL QUALITY
Remediation Division
P.O. Box 200901
Helena, Montana 59620

Contract Number 402014
Contract Task Order Number 41

Prepared by:

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REVIEWS AND APPROVALS

Tetra Tech EM Inc. Project Manager: J. Edward Surbrugg — J. Edward Surbrugg, Ph.D. — Date: 7/6/07

DEQ Project Officer: Catherine LeCours — Date: 7-3-07

EPA Remedial Project Manager: Paul Peronard — Date: 7/2/07

TROY ASBESTOS PROPERTY EVALUATION WORK PLAN

Tetra Tech EMI, July 2007

DOCUMENT REVISION LOG

Revision	Date	Primary Changes
TFO-00001	05/08/2007	Reduction of dust aliquot from 30 to 10
TFO-00002	05/08/2007	Maximum number of soil inspection points to 30, not based on square footage
TFO-00003	07/12/2007	Incorporate hierarchy of dust composite locations from Pilot Study
TFO-00004	07/12/2007	Temporary for a specific property
TFO-00005	08/01/2007	Dust sample collection criteria based on visual inspection and interview questions
TFO-00006	08/23/2007	Eliminate criteria for dust sample collection and return to sampling all buildings

DISTRIBUTION LIST

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Catherine LeCours	DEQ Project Officer	Montana Department of Environmental Quality – Helena, Montana
J. Edward Surbrugg	Tetra Tech Project Manager	Tetra Tech EM Inc. – Helena, Montana
Kathy Hernandez	EPA Remedial Project Manager	EPA – Denver, Colorado
Jeff Montera	CDM Libby Project Manager	CDM – Denver, Colorado
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Additional copies of the Troy Asbestos Property Evaluation Project documents can be made available to the above-listed persons for further distribution within their respective agencies.

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Appendix

FIGURES

TABLES

ACRONYMS AND ABBREVIATIONS

AHERA	Asbestos Hazard Emergency Response Act
AR	Aspect Ratio
ASTM	ASTM International (formerly the American Society for Testing and Materials)
CDM	Camp Dresser & McKee
CFR	Code of Federal Regulations
cm^2	Square centimeters
CPR	Cardiopulmonary resuscitation
DEQ	Montana Department of Environmental Quality
DQO	Data quality objective
EPA	U.S. Environmental Protection Agency
ESAT	Environmental Services Assistant Team
GPS	Global positioning system
HASP	Health and safety plan
ISO	International Organization for Standardization
ISTM	International Society for Testing Materials
L	Length
LA	Libby amphibole
Microvac	Microvacuum
OSHA	Occupational Safety and Health Administration
OU	Operable unit
PDA	Portable digital assistant
PDF	Personal data format
PPE	Personal protective equipment
PLM	Polarized light microscopy
QA	Quality assurance
QC	Quality control
s/cm^2	Structures per square centimeter
SEER	Surveillance, Epidemiology, and End Results program
SOP	Standard operating procedure
TAPE	Troy Asbestos Property Evaluation
Tetra Tech	Tetra Tech EM Inc.
USGS	United States Geological Survey
VCI	Vermiculite-containing insulation
Volpe Center	John A. Volpe National Transportation Systems Center

1.0 PROJECT DESCRIPTION AND BACKGROUND

Tetra Tech EM Inc. (Tetra Tech) received Task Order No. 41 from the Montana Department of Environmental Quality, Remediation Division (DEQ), under DEQ Contract No. 402014. The purpose of this task order is to complete a Troy Asbestos Property Evaluation (TAPE) Work Plan for the Troy Operable Unit Number 7 (OU7) of the Libby Asbestos Superfund Site. The United States Environmental Protection Agency (EPA) is the lead agency for the Libby Asbestos Superfund Site. DEQ is the lead agency for the Troy OU7 through a cooperative agreement with EPA. EPA requested that DEQ lead the Troy OU7 for financial savings and resource allocation. The TAPE Work Plan describes the field and property inspections and sample collection necessary to identify if and where amphibole asbestos is present within the Troy OU7 and the concentrations and quantity, if present. This information will be used at a later date to support cleanup decisions.

This TAPE Work Plan document is a combined field sampling plan and quality assurance project plan and is referred to as the TAPE Work Plan. Tables and figures in this document follow the first reference in the text. Appendix A contains the site-specific health and safety plan (HASP), Appendix B contains copies of Site-Specific Sampling Guidance, Appendix C is a list of equipment and supplies required for the project, Appendix D contains examples of information that may be provided to residents, Appendix E contains printouts of the TAPE project field forms, Appendix F contains the Soil Sample Preparation Work Plan, Appendix G contains the laboratory quality assurance and quality control (QA/QC) procedures, and Appendix H is the Data Management Work Plan.

1.1 PROJECT BACKGROUND AND PURPOSE FOR SAMPLING

From the 1920s until 1990, an active vermiculite mine and associated processing operations were located at Libby. While it was in operation, the vermiculite mine in Libby may have produced 80 percent of the world's supply of vermiculite (EPA 2005). Processed and exfoliated vermiculite has been used primarily for insulation in buildings and as a soil amendment. The Libby vermiculite deposit is contaminated with amphibole asbestos. For decades, the processing of vermiculite ore and generation and disposal of waste materials resulted in widespread amphibole asbestos contamination of the Libby community. In 1999, EPA Region 8 dispatched an emergency response team to investigate media reports of amphibole asbestos contamination and high rates of asbestos-related disease in Libby. Subsequent environmental investigations have found many areas in and around Libby contaminated with a form of amphibole asbestos known as Libby amphibole (LA).

The health effects from airborne exposure to the more common commercially used or encountered asbestos mineral forms (chrysotile, tremolite, actinolite, anthophyllite, amosite, crocidolite) include: (1) pleural disease (plaques, diffuse thickening, calcifications, and pleural effusions), (2) interstitial disease (asbestosis), (3) lung cancer, and (4) mesothelioma (a rare cancer of mesothelial cells in the pleura or peritoneum). The observed health effects associated with exposure to asbestiform amphibole fibers (LA) (Meeker and others 2003) at the Libby Asbestos Superfund Site have been well documented and are clearly consistent with illnesses seen due to exposure with the more common asbestos minerals (as noted below).

Studies performed in the early 1980s by researchers from McGill University (McDonald and others 1986a, McDonald and others 1986b) and the Centers for Disease Control and Prevention (CDC), National Institute for Occupational Safety and Health (NIOSH) (Amandus and others1987a, Amandus and others 1987b, Amandus and Wheeler 1987) found that former employees of the Libby vermiculite mine had significantly increased pulmonary morbidity and mortality from asbestosis and lung malignancies. Researchers at NIOSH who studied the annual chest x-rays of mine and mill workers with at least 5 years tenure (between 1975 and 1982) also found an increased prevalence of the radiographic abnormalities associated with asbestos-related disease. A recent follow-up study of Libby vermiculite workers who were previously evaluated in the 1980s, found that "this small cohort of vermiculite miners, exposed to amphibole fibers in the tremolite series, has suffered severely from both malignant and non-malignant respiratory disease" (McDonald and others 2002). The overall proportionate mortality among the group for mesothelioma (4.2 percent) was extremely high, being similar to that seen for crocidolite (considered by many to be the most toxic form of asbestos) miners in South Africa (4.7 percent) and Australia (3.9 percent) (McDonald and others 2002; 2004). For comparison, the age-adjusted incidence of mesothelioma in the United States (1992 through 2002) was about 0.001 percent (1 case per 100,000) with the occurrence of cases being extremely rare prior to age 50 (Surveillance, Epidemiology, and End Results [SEER] program 2005).

More recent studies completed at the Libby Asbestos Superfund Site have also found increased mortality and morbidity among former workers, as well as others in the community without any direct occupational exposures to the mine or processing activities. A mortality study conducted by investigators from the CDC Agency for Toxic Substances and Disease Registry (ATSDR) found markedly elevated death rates of asbestosis, lung cancer, and mesothelioma for the Libby community for the 20-year period examined (1979 through 1998). Mortality from asbestosis was approximately 40 times higher than the rest of Montana and 60 times higher than the rest of the United States (ATSDR 2000; 2002).

Large-scale medical screening of over 7,300 individuals who worked or lived in Libby for at least six months prior to 1990 found significantly increased rates of asbestos-related radiologic abnormalities. Approximately 18 percent (1,186 out of 6,668) of the participants with asbestos-related pleural abnormalities were identified by at least two out of three B-readers. The prevalence of pleural abnormalities increased with increasing exposure pathways, ranging from 6.7 percent for those who were not able to identify any specific exposure pathways aside from living in Libby to 34.6 percent for those who reported 12 or more specific exposure pathways. The majority of individuals (greater than 70 percent) with pleural abnormalities did not directly work for the mine or processing operations or with any secondary contractors for the mine (Peipins and others 2003).

EPA began investigations in Libby through a two-phased approach. The first phase of the investigation was used to determine if a time critical removal action was warranted in Libby to protect human health, to identify potential major source areas, and to identify the appropriate analytical methods for measuring concentrations of LA in those source materials (Camp Dresser and McKee [CDM] 2002). EPA began time critical removal actions in Libby in 1999. The second phase of the investigation was used to collect detailed information about airborne concentrations that result from sources of contamination that are disturbed (CDM 2003b). The combined results from the two phases of the investigation include:

- Exposure to LA is a threat to human health.
- Release of respirable LA fibers occurs when source materials are disturbed.
- Source materials include vermiculite insulation, vermiculite products (building materials) and process wastes, and contaminated soils.
- Contaminated indoor dust found in residential and commercial properties is a potential exposure pathway.
- There is widespread presence of LA throughout the Libby area.

As a result of the findings from the two phases of the investigation, and because the Libby Asbestos Superfund Site was listed on the National Priorities List in 2002, a further investigation of residences and businesses in the Libby study area boundary (Libby OU4) was warranted (EPA 2003b). EPA began the Libby Asbestos Superfund Site contaminant screening study, which was considered the first part of the remedial investigation, in 2002. The ongoing objective of the contaminant screening study is to obtain information concerning the presence and nature of LA contamination at properties in the Libby OU4 (CDM 2003a). As of January 2007, EPA and their contractors have investigated approximately 4,000 properties in the Libby area through the contaminant screening study.

Troy, Montana is located 18 miles northwest of Libby, Montana. The purpose of the TAPE is to characterize the nature and extent of LA source contamination present in the Troy OU7 boundaries. The investigative approach is similar to that of the contaminant screening study carried out for the Libby OU4, but makes improvements based on lessons learned from those activities. EPA believes that the nature of LA contamination and associated exposure pathways present in the Troy OU7 are similar to those observed in the Libby OU4. Limited investigations thus far have found that the vermiculite insulation found in Troy is similar in both morphology and mineralogy to the LA found in Libby (US Geological Survey [USGS] 2005). The draft Troy Conceptual Site Model (Section 1.2) illustrates that potential exposures in the Troy OU7 are similar to those in the Libby OU4. Therefore, a systematic screening of Troy area residences, public areas, schools, and businesses is necessary to gather sufficient information to determine how many Troy area properties are contaminated with LA. Some vermiculite mine workers lived in Troy and commuted to the mine to work each day. The mine workers were exposed to asbestos-contaminated materials at the mine and processing facilities, and they transported asbestos-contaminated dust to their homes on clothes and equipment. Residents of Troy also traveled to Libby for everyday activities such as shopping, working (other than at the mine), and attending school sporting events and likely came in contact with LA in Libby during these frequent visits. In addition, the asbestos-contaminated vermiculite ore and waste materials in varying forms may have been used for amending soils (as fill or as a conditioner), building materials (plaster, concrete, or chinking amendment), wood burning, spilled or placed on transportation corridors, and for insulating buildings in and around Troy.

1.2 CONCEPTUAL SITE MODEL

Exposure to airborne asbestos through inhalation is the main exposure route of concern which has the potential to result in malignant and non-malignant respiratory diseases. Oral ingestion of asbestos in environmental settings may also be a potential route of exposure and concern but acquisition of the data to fully evaluate the ingestion of LA is not included in this TAPE Work Plan. Figure 1-1 presents a draft conceptual site model for the Troy OU7, which identifies only the exposure pathways by which LA asbestos fibers from the Libby mine might be inhaled by humans. The primary inhalation pathways are inhalation of outdoor ambient air, air near disturbed soil, and indoor air. Additional potential exposure pathways include air near unenclosed sources (such as in attics) and air near breached walls. The draft conceptual site model will be refined as additional data are acquired and the understanding of actual transport and exposure pathways for the Troy OU7 is improved. It is not the intent of this Work Plan to investigate all pathways identified in the conceptual site model.

Sources

Release and Transport Pathways

Contaminated Media

Exposure Route

Receptor and Exposure Location (Current and Hypothetical Future)

Resident | Commercail Worker | Tradesperson | Students / Teachers | Recreational Worker

Mine Site

Past Mining, Milling, Processing Operations

Product (Vermiculite)

Solid Waste

Indoor Insulation

Outdoor Soil

Structural Fires

Spills

Dust on Workers' Clothing

Bulk Transport

Surface Water Runoff

Sediment

Historic and Current Airborne Releases

Spillage Along Highways, Rail Lines

Rain

Tree Bark

Building Roofs and Surfaces

Unenclosed (For Example, Attic Spaces, Crawl Spaces)

Enclosed (For Example, Walls)

Leaks

Indoor Dust

Carpets, Upholstery, Air Ducts, etc.

Contaminated Soil Along Highways, Rail Lines

Dust in Vehicles

Soil Disturbance

Wind

Burning

Outdoor Air Near Fire Location

Air in Attic or Near Other Unenclosed Vermiculite

Indoor Air Near Breached Walls

Indoor Air (Living Spaces)

Outdoor Air Near Highways and Rail Lines

Dust in Air of Vehicles

Outdoor Air Near Disturbed Soil

Outdoor Ambient Air

Ash From Burned Wood

Dust on Roofing or Other Outdoor Surfaces

I — Inhalation Exposure Route

● Pathway is complete and exposure may be significant; Quantitative evaluation is warranted.

○ Pathway is complete but is believed to be minor in comparison to other pathways; Qualitative evaluation is warranted.

? Pathway may be complete but magnitude of exposure is uncertain; Further investigation may be necessary.

Pathway is incomplete or believed to be negligible; Further evaluation is not warranted.

→ Pathway for potential exposure

→ Pathway investigated by the TAPE

TROY ASBESTOS PROPERTY EVALUATION
TROY, MONTANA

FIGURE 1-1
Conceptual Site Model -
Potential Human Inhalation Exposure Pathways to Asbestos
Operable Unit 7
(Troy Residential, Commercial, and Public Areas)

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FIG_1-1_Conc Site Model.dwg - DWH - 05/21/2007 - S1176-41-TROYWP

The bolded pathways shown on Figure 1-1 show that the specific pathways to be investigated under this Work Plan include air near unenclosed sources, air near breached walls, indoor air, and air near disturbed soil. Future Work Plans will be prepared to investigate the remaining pathways.

1.3 TROY OU7 INFORMATION

The Troy OU7 is located along the Kootenai River valley at an elevation ranging from 1,850 feet above mean sea level at the northern end of the OU7 to 2,500 feet above mean sea level on the mountain slopes surrounding the valley. The Troy OU7 is approximately 8 miles long and up to 1.8 miles wide. Topography of the Troy OU7 consists of relatively flat river valley terraces on both sides of a gently graded Kootenai River. Several tributaries flow into the Kootenai River along the 8-mile stretch contained within the Troy OU7. Figure 1-2 provides a topographic view of the Troy OU7 boundaries. The Troy OU7 boundary was selected to ensure that investigations captured most of the older homes in and around Troy that are mostly likely to be contaminated. Based upon unique conditions of certain properties outside the OU boundary, DEQ and EPA may consider addressing them on a case-by-case basis or expanding the OU boundary. For instance, if the contamination is clearly related to the vermiculite mine (such as buildings transported from the mine or obvious vermiculite processing waste), DEQ and EPA may investigate and/or cleanup that property. Property owners are encouraged to contact the DEQ Troy Information Center to discuss certain properties outside the OU boundary.

1.4 SCHEDULE

The TAPE inspection and sampling field work will begin in the summer 2007 and will require approximately 40 weeks to complete. A training session for all field personnel will be completed from April 23 through 27, 2007 and the inspection and sampling will begin on April 30, 2007. The 2007 field season is scheduled to end on September 14 for a total of 20 weeks. A second field season of inspections and sampling is scheduled for completion in 2008. Tetra Tech will prepare an interim and final TAPE field summary report approximately 90 days after the completion of the field work each summer.

1.5 WORK PLAN ORGANIZATION

This TAPE Work Plan is organized into eight sections. Section 1.0 is this introduction. The contents of Sections 2.0 through 8.0 are briefly described below.

- Section 2.0 Project Organization. This section identifies key project personnel and project responsibilities and provides an organizational chart and a table of participants with contact information.

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TROY MONTANA

FIGURE 1-2
TOPOGRAPHIC VIEW OF THE TROY OPERABLE UNIT SITE LIBBY ASBESTOS SUPERFUND SITE

LOCATION OF LARGER MAP

MONTANA

Troy Study Area Boundary

N

0 1.2 Miles

GIS map by Ed Madej TTEMI-HE
Fig_1-2_troy_basemap_study_area_052907.mxd

- Section 3.0 Work Plan Rationale. This section describes the data quality objective (DQO) steps used to establish the quantity and the quality of data to support decision making.
- Section 4.0 Field Procedures. This section describes the activities that will take place during the property evaluations. The Site-Specific Sampling Guidance for each activity and the HASP are referenced and detailed.
- Section 5.0 Field Quality Control Procedures. This section discusses the field QA/QC procedures, including equipment decontamination, QC samples, field documentation, and chain of custody. Also discussed in this section are QA procedures used at the Libby Asbestos Superfund Site (CDM 2007).
- Section 6.0 Data Management. This section describes how the data will be handled from when they have been collected in the field until transfer to the EPA Libby Data Reporting Tables.
- Section 7.0 QA/QC Procedures. This section describes the procedures that will be taken to ensure the quality and integrity of the TAPE data.

Finally, references used in preparing this document are presented in Section 8.0.

2.0 PROJECT ORGANIZATION

Table 2-1 presents the responsibilities and contact information for key personnel involved in the TAPE inspection and sampling project. In some cases, more than one responsibility has been assigned to a person. Figure 2-1 presents an organizational chart to graphically represent the relationships between the different Agencies, Contractors, and other parties involved with the TAPE project.

EPA and DEQ have agreed that DEQ is the lead agency responsible for performing the field work in support of the TAPE project. This work is funded by EPA through a cooperative agreement between EPA and DEQ. Specifically, DEQ is responsible for performing community relations activities; obtaining access to properties; scheduling property inspections, performing the property inspections described in this Work Plan; collecting all field samples described in this Work Plan including those samples required by the Health and Safety Plan; performing sample labeling, handling, and tracking; and entering field data into EPA Libby Data Reporting Tables. DEQ, through its contractor Tetra Tech, is responsible for delivering field samples under chain of custody to EPA for sample preparation and analysis. The exception to this is that Tetra Tech will provide for air and dust samples (collected pursuant to the Health and Safety Plan), dust lot blank samples (see Section 5.2), and equipment decontamination water samples and initial dust samples from field teams (to verify appropriate collection methods) (see Section 5.2) to be relinquished under chain of custody to CDM for rapid turn-around analysis at the appropriate laboratories.

TABLE 2-1

KEY PERSONNEL

Name	Organization	Role	Responsibilities	Contact Information
Catherine LeCours	DEQ	Project Officer	• Monitors performance of the contractor • Reviews and approves QA measures • Consults with the EPA and Volpe • Reviews and approves all Work Plans • Provides coordination with ESAT and EPA • Provides primary interface with the Troy community and disseminate project information to the public	Montana Department of Environmental Quality PO Box 200901 Helena, MT 59620-0901 clecours@mt.gov (406) 841-5040 (406) 431-1630 (cell)
J. Edward Surbrugg	Tetra Tech	TAPE Project Manager	• Responsible for implementing all activities called out in the task order • Supervises preparation of Work Plan and approves document • Monitors and directs field activities to ensure compliance with Work Plan requirements • Provides coordination with DEQ Project Officer • Disseminate project information to interested parties and Troy property owners and direct questions to DEQ	Tetra Tech, Helena, MT 7 West 6th Avenue Helena, MT 59601 edward.surbrugg@ttemi.com (406) 442-5588 (406) 459-0881 (cell)
Mark Stockwell	Tetra Tech	- TAPE Field Team Leader - TAPE QA/QC Manager	• Responsible for conducting training of personnel and providing oversight of personnel scheduling • Responsible for directing and coordinating day-to-day field activities conducted by Tetra Tech • Verifies that field sampling and measurement procedures follow Work Plan • Conducts internal field audits for QA/QC • Provides DEQ Project Officer and TAPE project manager with regular reports on status of field activities • Disseminate project information to interested parties and Troy property owners and direct questions to TAPE project manager or DEQ	Tetra Tech, Sandpoint, ID 324 Larchwood Drive Sandpoint, ID 83860 mark.stockwell@ttemi.com (208) 263-4524 (916) 715-8442 (cell)

TABLE 2-1
(Continued)

KEY PERSONNEL

Name	Organization	Role	Responsibilities	Contact Information
Angela Bolton	Tetra Tech	Troy Field Data Coordinator	• Responsible for working with TAPE project manager and TAPE field team leader to schedule TAPE inspections • Responsible for compiling, organizing, and auditing field data sheets and samples submitted daily by field teams • Responsible for transferring field data sheets and samples to the ESAT Troy Sample Coordinator • Coordinate with ESAT and EPA managers on sample delivery schedules and logistics • Disseminate project information to interested parties and Troy property owners and direct questions to TAPE project manager or DEQ	Tetra Tech DEQ Troy Information Center 303 N. Third Street P.O. Box 1170 Troy, MT 59935 (406) 295-9238
Mark Stockwell	Tetra Tech	On-site TAPE Safety Officer	• Responsible for implementing health and safety plan and for determining appropriate site control measures and personal protection levels • Conducts safety briefings for Tetra Tech and site visitors • Can suspend operations that threaten health and safety • Disseminate project information to interested parties and Troy property owners and direct questions to TAPE project manager or DEQ	Tetra Tech DEQ Troy Information Center 303 N. Third Street P.O. Box 1170 Troy, MT 59935 (406) 295-9238
Rick Ecord	Tetra Tech	Tetra Tech Health and Safety Officer	• Approve the Troy Health and Safety Plan. • Provide a resource for all health and safety issues.	Tetra Tech, Atlanta, GA Centennial Tower 101 Marietta Street, NW Atlanta, GA 30303 richard.ecord @ttemi.com (404) 225-5527

TABLE 2-1
(Continued)

KEY PERSONNEL

Name	Organization	Role	Responsibilities	Contact Information
Ed Madej	Tetra Tech	Database and Geographic Information System Manager	• Responsible for developing, monitoring, and maintaining project database and property maps • Responds to requests from TAPE project manager and TAPE field team leader to provide copies of property maps to field teams on a daily basis • Imports laboratory electronic data deliverables into the Troy project Scribe database. • Works with EPA data and graphic managers to generate needed reports and maps from the Troy project Scribe database	Tetra Tech, Helena, MT 7 West 6th Avenue Helena, MT 59601 edward.madej@ttemi.com (406) 442-5588
Randy Dorian	Tetra Tech	PDA and Database Programmer	• Responsible for PDA programming • Integrate PDA data into the EPA Libby Data Reporting Tables	Tetra Tech, Denver CO 950 17th Street Denver, CO 80202 randy.dorian@ttemi.com (303) 312-8832
Candy Friday	Tetra Tech	Data Validation Coordinator	• Manage the validation of the laboratory data • Review all data validation reports	Tetra Tech, Houston TX Regency Center 2901 Wilcrest Drive Suite 410 Houston, TX 77042-6012 Candy.Friday@ttemi.com (832) 251-5166
10 members	Tetra Tech	Field Team Member	• Responsible for conducting TAPE inspections and sampling as described in the Work Plan and for following guidance. • Disseminate project information to interested parties and Troy property owners and direct questions to TAPE project manager or DEQ	Tetra Tech DEQ Troy Information Center 303 N. Third Street P.O. Box 1170 Troy, MT 59935 (406) 295-9238
Martin McComb	EPA	Mobil Soil Preparation Laboratory	• Manage the ESAT work assignment to ensure preparation of all soil samples • Ensure proper storage of soil and dust samples until transfer under chain of custody to laboratories	Martin McComb U.S. EPA, Region 8 1595 Wynkoop St. Denver, CO 80202-1129 (303) 312-6963

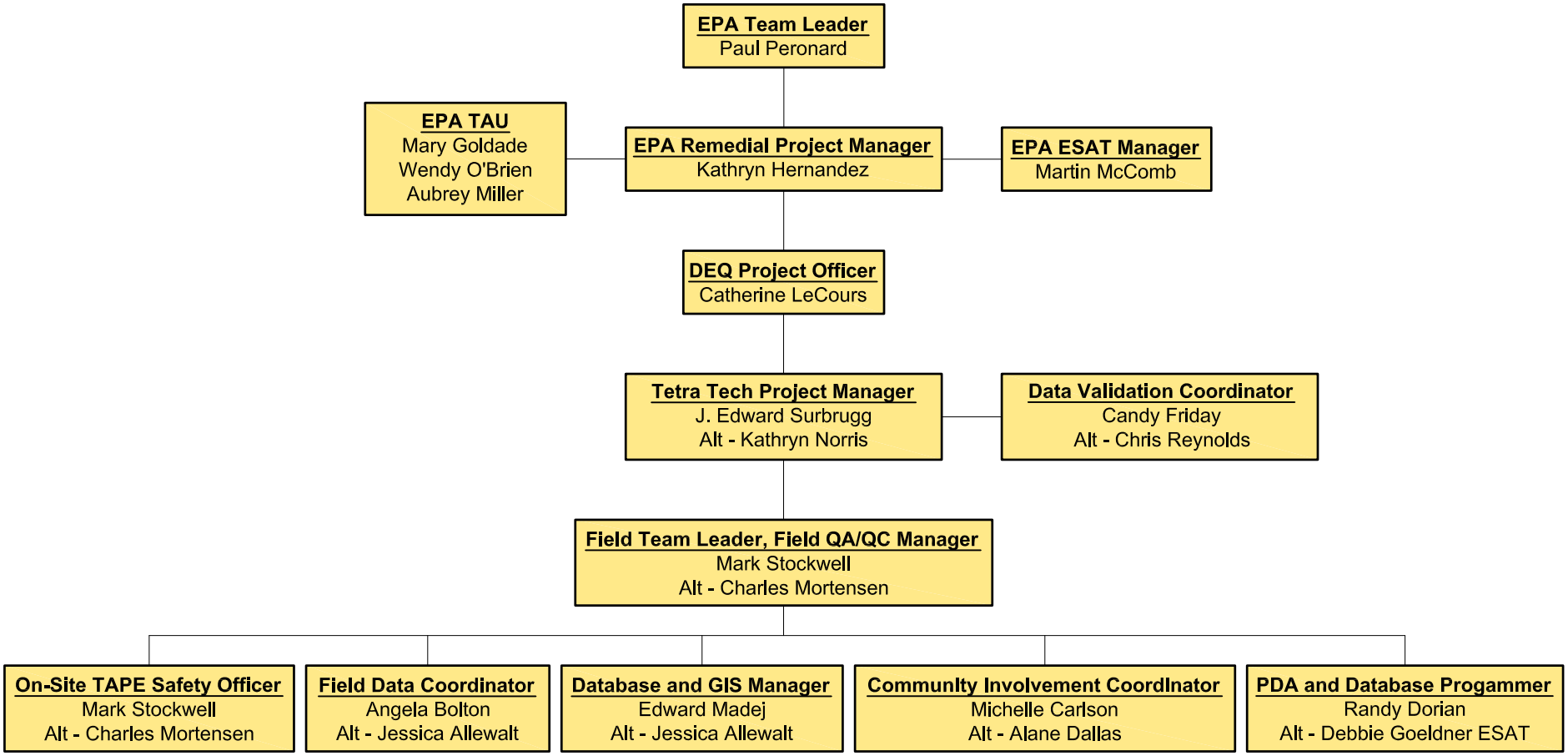
TABLE 2-1
(Continued)

KEY PERSONNEL

Name	Organization	Role	Responsibilities	Contact Information
Paul Peronard	EPA	Team Leader	• Overall project coordination • Oversight of schedule and budget • Approval of all Work Plans and modifications • Coordination with DEQ • Coordinates independent field audit	Paul Peronard U.S. EPA, Region 8 1595 Wynkoop St. Denver, CO 80202-1129 (303) 312-6808

Notes:

DEQ	Montana Dept. of Environmental Quality	EPA	U.S. Environmental Protection Agency
ESAT	EPA Environmental Services Assistance Team	PDA	Portable digital assistant
TAPE	Troy Asbestos Property Evaluations	Tetra Tech	Tetra Tech EM Inc.
QA/QC	Quality Assurance/Quality Control		



Legend (Acronyms)

ALT - Alternate
DEQ - Montana Department of Environmental Quality
EPA - Environmental Protection Agency
ESAT - EPA Environmental Services Assistance Team
GIS - Geographic Information System
PDA - Personal Digital Assistant
QA - Quality Assurance
QC - Quality Control
TAPE - Troy Asbestos Property Evaluation
TAU - Technical Advisory Unit

TROY ASBESTOS PROPERTY EVALUATION
TROY, MONTANA

FIGURE 2-1
Organization Chart

TETRA TECH EM, INC.

FIG_2-1_Organization Chart.dwg - DWH - 07/02/2007 - S1176-41-TROYWP

EPA is responsible for sample preparation and analysis of all soil and dust samples collected under the TAPE Work Plan and management of the Libby project database. EPA's Environmental Services Assistance Team (ESAT), staffed by the EPA contractor Techlaw, Inc., is responsible for preparing soil samples for analysis in accordance with the Soil Preparation Work Plan (Appendix F). The ESAT will receive both soil and dust field samples under chain of custody from Tetra Tech, prepare soil samples for analysis, enter soil sample preparation data into EPA Libby Data Reporting Tables, and ship both soil and dust samples under chain of custody to the appropriate project laboratories.

2.1 AGENCY OVERSIGHT

The DEQ Project Officer (or designee) will provide oversight of all field activities associated with this TAPE project. DEQ and EPA oversight personnel will have the ability to inspect all field and sampling activities, determine the appropriateness of the recorded data, and ensure that all activities comply with standard practices and meet the project objectives. Before any oversight is conducted, the Tetra Tech on-site health and safety coordinator will brief the DEQ and EPA oversight personnel to ensure safe practices are maintained throughout the TAPE field effort.

2.2 NON-AGENCY OBSERVATION OF FIELD ACTIVITIES

The request for non-Agency observation of field activities must first be coordinated with and approved by the DEQ Project Officer and property owner. When inspection and sampling are being conducted on a Troy property and the owners are present, the property owners will have the opportunity to (1) observe Tetra Tech field inspection and sampling, (2) obtain copies of the field forms and field sketches completed for the property, (3) obtain a receipt for samples collected, and (4) obtain a portion of samples collected (at the cost of the property owner). The Tetra Tech field team will brief property owners about the types of sampling and methods for completing the TAPE inspection and sampling; however, the Tetra Tech field team will not interpret results or make conclusions from the inspection and sampling for the property owner.

If Tetra Tech obtains soil or dust samples at a property, Tetra Tech will, if requested, provide the property owner with a receipt for the samples identifying the number and types of samples collected. Sample receipts and a copy of the inspection notes will be available to property owners the day after sample collection at the DEQ Troy Information Center. An example sample receipt is in Appendix D. Tetra Tech field team members are encouraged to engage in conversation with the occupants during the inspection to relate the location of any observed VCI or other potential asbestos-containing materials, discuss potential methods to reduce occupant exposure to potential LA or other asbestos contamination,

the availability of the Environmental Resource Specialist Program, and any other questions the occupant may have related to LA. No sample results will be available during the TAPE inspection and sampling. An individual property owner who requests a portion of a sample must supply all necessary materials required for sampling, as well as arrange and pay for laboratory analysis of all additional samples collected.

2.3 SPECIAL TRAINING AND CERTIFICATES

Tetra Tech personnel who work on the TAPE project will have met the Occupational Safety and Health Administration (OSHA) training requirements defined in Title 29 Code of Federal Regulations (29 CFR) Part 1910.120(e) for working on hazardous waste sites. These requirements include: (1) 40 hours of formal off-site instruction; (2) a minimum of 3 days of actual on-site field experience under the supervision of a trained and experienced field supervisor; and (3) 8 hours of annual refresher training.

Tetra Tech personnel working on the TAPE project must read and abide by the stipulations and guidelines set forth in Tetra Tech's HASP (Appendix A). The HASP provides written instructions for health and safety training requirements, personal protective equipment (PPE) requirements, a spill containment program, and health-hazard monitoring procedures and techniques. At least one member of every Tetra Tech two- or four-person field inspection team will maintain current certification in the American Red Cross "Multimedia First Aid" and "Cardiopulmonary Resuscitation (CPR) Modular" or equivalent.

Copies of Tetra Tech's health and safety training records, including course completion certifications for the initial and refresher health and safety training, specialized Asbestos Hazard Emergency Response Act training, and first aid and CPR training, are maintained in the Helena Tetra Tech office files for all TAPE field team members.

Before field work begins for the TAPE Work Plan project, Tetra Tech personnel are required to undergo site-specific training that thoroughly covers the following areas:

- Implementation of the TAPE Work Plan
- Names of personnel and alternates responsible for health and safety at a project site
- Health and safety hazards present on site, including heat, physical stressors, insects, ticks, and other potential biological hazards
- LA-specific morphology and health risks
- Selection of the appropriate personal protection levels
- Correct use of PPE

- Work practices to minimize risks from hazards
- Safe use of engineering controls and equipment on site
- Medical surveillance requirements, including recognition of symptoms and signs that might indicate overexposure to hazardous substances, physical stressors (heat, cold), and other potential hazards
- Contents of the HASP
- Community relations
- Use of portable digital assistants (PDAs)

3.0 TROY DATA QUALITY OBJECTIVES

This section presents the DQOs for the TAPE inspection and sampling project. The DQOs are qualitative and quantitative statements developed through the seven-step DQO process (EPA 2000a; 2000b). The DQOs help to clarify the study objectives, define the most appropriate data to collect and the conditions under which to collect the data, and specify tolerable limits on decision errors that will be used as the basis for establishing the quantity and quality of data needed to support decision-making. The DQOs are used to develop a scientific and resource-effective design for data collection.

Step 1- State the Problem

Previous investigations have determined that LA is present in multiple environmental media in the town of Libby, MT including indoor air, outdoor ambient air, indoor dust, VCI, and soils. As a result, residents of Libby may be exposed to LA and these exposures may present an unacceptable risk of adverse health effects under certain exposure conditions.

The town of Troy, MT, designated as OU7 of the Libby Asbestos Site, may be similarly impacted by LA based on:

- The proximity of Troy to Libby;
- The likely historical transport of asbestos-contaminated dust on the clothing and equipment of mine workers living in Troy;
- The results of limited investigations that indicate the VCI found in Troy is similar in both morphology and mineralogy to LA; and
- Information indicating that materials from the Libby mine were brought to Troy in the past.

The magnitude of the potential exposure of residents and workers in Troy to LA in Troy is currently unknown. Additional data are needed to support decisions about short term response actions at Troy.

Step 2 - Identify the Decision

The decisions EPA and DEQ seek to make are:

1) Do VCI and/or visible vermiculite need to be removed from specific properties in Troy?

2) Do specific properties in Troy contain levels of LA in soil and/or dust that need to be addressed by short term response actions?

Step 3 – Identify Inputs to the Decision

Each decision identified in Step 2 requires specific inputs as follows:

Decision: Do VCI and/or visible vermiculite need to be removed from specific properties in Troy?

Input: Reliable visual observations and measurements of VCI and/or visible vermiculite obtained from systematic inspections of living and working spaces and attics in every property in Troy.

Decision: Do specific properties in Troy contain levels of LA in soil that need to be addressed by short term response actions?

Inputs:

- Measurements of the average concentration of LA in soil within each specific use area, common use area, limited use area, and interior surface zone within the property
- Observations of vermiculite in soil within each use area within the property

Decision: Do specific properties in Troy contain levels of LA in dust that need to be addressed by short term response actions?

Inputs: Measurements of the average concentration of LA in dust over each floor of each building on the property, representative of accessible, infrequently accessed, and inaccessible areas.

Step 4 - Define the Study Boundaries

Vermiculite and other LA-contaminated wastes were historically transported from the Libby mine and randomly placed on Troy properties. Similarly, the use of VCI in homes and other buildings in Troy is expected to be random. DEQ has therefore determined that the study area for the TAPE will be every developed property within the OU7 boundaries, including residential properties, commercial properties, schools, parks, and all publicly-owned property. The approximate number of individual properties to be investigated is 1,198.

All data required to support project objectives will be collected at each property during a one-time sampling event. Completion of the required investigations at all properties is expected to take at least two field seasons. The first season is expected to occur during the summer of 2007 and the second season is expected to occur during the summer of 2008.

Step 5 - Develop Decision Rules

Decision: Do VCI and/or visible vermiculite need to be removed from specific properties in Troy?

Decision Rule: If uncontained, migrating VCI or visible vermiculite is observed in indoor living spaces or working spaces or uncontained VCI or visible vermiculite is observed in attics, the property will require a response action to remove the VCI and/or visible vermiculite.

Decision: Do specific properties in Troy contain levels of LA in soil that need to be addressed by short term response actions?

Decision Rules:

- If visible vermiculite is observed within a specific use area on the property, the specific use area will be cleaned up in a short term response action.
- If the average concentration of LA in soil within any use area on the property exceeds the action level for soil established by EPA in a decision document for OU7, any detectable LA in soil within the property will be cleaned up in a short term response action.

Decision: Do specific properties in Troy contain levels of LA in dust that need to be addressed by short term response actions?

Decision Rule: If the average concentration of LA in dust over an interior building level (floor) exceeds the action level for indoor dust established by EPA in a decision document for OU7, the entire building level from which the dust sample was collected will be cleaned up.

Step 6 - Specify Tolerable Limits on Decision Errors

Two types of decision errors are possible. A Type I (false negative) decision error would occur if a decision is made that a response action is not necessary when in fact, a response action is necessary. A Type II (false positive) decision error would occur if a decision is made to undertake a response action when in fact, it's not necessary.

For the TAPE project, EPA and DEQ are most concerned about establishing limits on the occurrence of Type I errors. EPA recommends the following limit on Type I decision errors:

-No more than a 10% chance of not taking a response action when one is required

For soil, if the measured average concentration of LA in soil within any use area on the property is less than the action level for soil, there should be no more than a 10% chance that the true average exceeds the action level. For dust, if the measured average concentration of LA in dust over an interior building level (floor) is less than the action level for indoor dust, there should be no more than a 10% chance that the true average exceeds the action level.

The soil and dust data collected under the TAPE to support short term response action decisions within OU7 will be based on measurements of the average concentration of LA within use areas (for soil) and over a building level (for dust). A composite sampling approach has been chosen for soil. Therefore, information on individual soil sample variability within each use area at each property will not be available. However, this is not thought to be a serious concern since the analytical method for detecting LA in soil is semi-quantitative. Analytical results for LA in soil are assigned to one of four concentration bins ranging from non-detect (Bin A), trace (less than 0.2%, but LA detected) (Bin B1), between 0.2% and 1% (Bin B2), and greater than 1% (Bin C). As part of its investigation of the Libby Asbestos Site, EPA performed a study on the accuracy of the analytical method for LA soil, Polarized light microscopy (PLM) visual estimation. The International Society of Testing and Materials (ISTM) 2 results indicate that 77% of reference soil samples were accurately assigned to the appropriate bin and, of the reference samples not accurately reported, 22 out of 23 (96%) were reported in a concentration bin higher than the reference concentration. These results indicate that the analytical method is more likely to overestimate than underestimate the true concentration of LA. For dust, the variability of the composite sample will be assessed by collecting and analyzing duplicate samples from randomly selected properties within OU7 during the TAPE project.

Step 7 – Optimize the Design for Obtaining Data

A composite sampling design has been selected for both soil and dust in order to measure the average concentration within use areas (for soil) and building levels (for dust). Composite sampling involves physically combining and homogenizing environmental samples or sub-samples to form a single sample. If the concentrations of a contaminant could be measured accurately in the individual samples as well as in their composite, and if the compositing process is carried out properly, then the concentration measured in the composite sample is expected to be equal to the average of the concentrations measured in the individual samples (assuming no measurement errors).

Estimating the Number of Samples Required

For soil, one composite sample consisting of 30 sub-samples will be collected from each use area delineated at a property. Within specific use areas, the sampling depth will be 0"- 6" since this is the depth most likely to be routinely disturbed by activities within the specific use area (i.e., gardening and landscaping). Within common use areas, limited use areas, and interior surface zones, the sampling depth will be 0"-3" since this depth represents the surfical contamination—the depth most likely to be routinely disturbed by activities within these use areas (i.e., lawn mowing and playing on the lawn).

For dust, one composite sample consisting of 10 sub-samples will be collected from each building level. The 10 sub-samples will be distributed as 4 sub-samples from accessible areas, 4 sub-samples from infrequently accessed areas, and 2 sub-samples from inaccessible areas that best represent dust over the entire building level.

The sampling design of composite samples for soil and dust was selected because this design results in approximately the same precision of an estimated average concentration over the sampling area as that provided by the same number of individual samples.

Estimate the Required Analytical Sensitivity

Although no decisions have been made by EPA about the level of LA in soil or dust that requires a short term response action at OU7, previous EPA decisions at the Libby Asbestos Site have been based on LA action levels of 1% for soil and 5000 structures per square centimeter (s/cm^2) using AHERA counting methods for dust.

In the absence of an EPA decision about the action levels for LA in soil and dust in OU7, for planning purposes, the analytical sensitivities must be low enough to detect LA at levels below the action levels for other areas of the Site. The required analytical sensitivities and analytical methods for the TAPE program are:

Soil: Practical Quantitation Limit = 0.2 weight percent LA
Sampling Method: Guidance CDM-Libby-05
Preparation Method: SOP EPA SRC-Libby-01
Analytical Method: SOP SRC-Libby-03

Dust: Analytical Sensitivity: 500 s/cm^2
Sampling Method: ASTM International (ASTM) D5755 modified per Guidance CDM-Libby-10
Analytical Method: ASTM D5755 (AHERA) modified counting rules (Length (L)≥0.5 µm, aspect ratio (AR)≥3:1) and preparation techniques per Libby laboratory modification forms for investigative samples International Organization for Standardization (ISO) 10312

Equipment Blanks:
Analytical Sensitivity: Read 10 grid openings
Analytical Method: (AHERA) modified counting rules (L≥0.5 µm, AR≥3:1) and preparation techniques per Libby laboratory modification forms for investigative samples (Do not use water testing protocols).

4.0 FIELD PROCEDURES

This section of the TAPE Work Plan describes the field activities to be implemented for the TAPE inspection and sampling project and includes the following tasks:

- Mobilizing and demobilizing
- Obtaining access agreements
- Scheduling inspections with property owners
- Conducting verbal interviews (recorded in the PDA)
- Conducting property inspections – indoor, attic, outbuildings, exterior use areas (recorded in the PDA)
- Conducting semi-quantitative visual estimations of vermiculite in soils (recorded in the PDA)
- Collecting indoor dust samples (recorded in the PDA)
- Collecting indoor and outdoor soil samples (recorded in the PDA)
- Decontaminating equipment and personnel
- Containing and disposing of investigation-derived waste

Current versions of Site-Specific Sampling Guidance are provided in Appendix B and are referenced throughout this section of the TAPE Work Plan. TAPE-specific modifications are detailed in this Work Plan.

- CDM-LIBBY-10, Collection of 30-Point Composite Microvacuum Dust Samples for Determining Nature and Extent of Libby Amphibole Asbestos (LA) in Indoor Dust
- CDM-LIBBY-05, Soil Sample Collection at Residential and Commercial Properties
- CDM-LIBBY-06, Semi-Quantitative Visual Estimation of Vermiculite in Soils at Residential and Commercial Properties

Table 4-1 lists all the samples that will be collected, the analytical methods and required analytical turn-around times. Health and safety protocols and requirements will apply to all field activities and are summarized below. Information on quality control is provided in sections 5.0 and 7.0 of this tape Work Plan.

4.1 HEALTH AND SAFETY PROCEDURES

The TAPE HASP (Appendix A) and Tetra Tech's corporate health and safety program plan will apply to all field activities undertaken as part of this project. All field staff conducting inspection and sampling activities will be required to:

1. Hold a current OSHA hazardous waste operations 40-hour training certification and up-to-date 8-hour refreshers, as required under 29 CFR 1910.120;
2. Have medical clearance to work wearing a full-face or half-face air purifying respirator; and
3. Be qualitatively fit-tested for the specific project respirator within the 12 months prior to the field activities.

The TAPE HASP in Appendix A provides detailed health and safety protocols and requirements, including directions for when to use PPE, such as respirators. All attic and crawl space entries will be conducted in modified level C PPE that will include a half-face or full-face air purifying respirator with HEPA cartridges. Other property inspection activities, including dust sampling and soil sampling, will be conducted in modified level D PPE. Mr. Mark Stockwell will be the Tetra Tech site safety officer for the field activities (Table 2-1).

TABLE 4-1

TAPE SAMPLES

SAMPLE PURPOSE	SAMPLE TYPE	SAMPLE MEDIA	NUMBER PER WEEK	ANALYSIS	TURN-AROUND TIME
Interior Dust Characterization	10-Point Composite	Dust	180[a]	TEM-ASTM D5755-03	Standard
Soil Characterization	30-Point Composite	Soil	300[b]	TEM-EPA-LIBBY-03	Standard
QA/QC	Field Blank	Dust	10	TEM-ASTM D5755-03	Standard
QA/QC	Lot Blanks	Dust	6	TEM-ASTM D5755-03	72 Hour
QA/QC	Equipment Blanks	Water	3	EPA/600/4-84-043	Standard
QA/QC - Dust	Duplicate	Dust	9	TEM-ASTM D5755-03	Standard
QA/QC – Soil	Duplicate	Soil	15	TEM-EPA-LIBBY-03	Standard
Health and Safety	Stationary Air	Dust in Air	3	NIOSH 7400 PCM	24 Hour
Health and Safety	Personal Air	Dust in Air	3	NIOSH 7400 PCM	24 Hour

Notes:

QA/QC Quality Assurance/Quality Control

[a] Assumes 3 sampling teams, 10 properties per week per team, 6 samples per property

[b] Assumes 3 sampling teams, 10 properties per week per team, 10 samples per property

Work that may result in potential employee exposure to airborne asbestos above the prescribed permissible exposure limit or short-term exposure limit requires an exposure assessment regulated under the OSHA reference method 29 CFR Part 1910.1001. The determinations of employee exposure will be made from breathing zone air samples representative of the 8-hour time-weighted average and 30-minute short-term exposure limit for each employee work category. The permissible exposure limit is 0.1 fibers per cubic centimeter for the 8-hour time-weighted average, and the short-term exposure limit is 1.0 fibers per cubic centimeter over a 30-minute period as set forth in 29 CFR Part 1910.1001 (j)(2)(iii). Negative exposure assessments for the field teams will be performed during the initial stage of the TAPE and as necessary during the process, as described in the HASP and at the direction of the site safety officer. Stationary samples will also be collected at the DEQ Troy Information Center, the on-site soil preparation laboratory, and at other properties to document airborne fiber levels.

4.2 SITE ACCESS AND LOGISTICS

Section 4.2 provides information about community relations, logistics and schedules, and site access agreements.

4.2.1 Community Relations and Information Centers

Tetra Tech will coordinate with DEQ to ensure that sufficient public outreach (including public meetings, fact sheets, newspaper articles and notices, and radio announcements) is completed before and during implementation of the TAPE. Tetra Tech will provide personnel to attend public meetings in Troy and Libby and will help prepare presentation materials, at DEQ's request. Public outreach and information on the purpose and nature of the TAPE and its role in the overall investigations and cleanup at Troy and Libby are essential to its success.

Tetra Tech and DEQ will provide public information at the DEQ Troy Information Center at 303 N. Third St. and the sampling teams will also have some public information to hand out during the inspections. The Information Center is centrally located across from the Troy Senior Center, next door to the public library, and on the same street as the Troy City Hall. The DEQ Troy Information Center will also serve as the Tetra Tech Troy field office and will be the TAPE logistical center for obtaining property access agreements, scheduling field activities, returning samples and field forms at the end of the day, and transferring sample custody from Tetra Tech to either CDM or the ESAT sample preparation laboratory. The DEQ Troy Information Center will also provide a physical location and venue for people in Troy to provide and obtain information about the project. The DEQ Troy Information Center will also have telephones and answering machines for contacting project personnel when the office is not staffed and

after regular hours (Monday through Friday 8:00 am to 4:30 pm). The address and phone number for the DEQ Troy Information Center will be advertised and posted at the location.

The existing EPA Information Center at 501 Mineral Avenue in Libby will also be an information resource for Troy residents, providing access to major project documents. Information about the Libby Asbestos Superfund Site is also available on the Internet at http://www.epa.gov/region8/superfund/libby.html. DEQ will maintain updated information regarding Troy on this webpage.

Section 2.0 of this Work Plan discusses the roles and responsibilities of the DEQ and Tetra Tech in community relations.

4.2.2 Logistics and Schedule

DEQ and Tetra Tech will staff the DEQ Troy Information Center in Troy for the duration of TAPE field activities. Tetra Tech and DEQ will identify and provide all necessary personnel, sampling equipment, PPE, and project materials for implementing this Work Plan. All Tetra Tech field personnel will be trained not only in specific tasks but also on the overall objectives of the TAPE. This training will facilitate TAPE implementation and allow for effective communication with the public and other team members.

The Tetra Tech TAPE project manager will oversee all project activities and logistics and will ensure that the lines of communication are maintained to resolve any issues or concerns that may arise during the field efforts. The Tetra Tech TAPE project manager will reside in Helena but will be at the project site in Troy for about 25 percent of the field activities. The TAPE field team leader will be based out of Troy and will be responsible for obtaining site access agreements, assisting with public outreach, scheduling daily field activities, and providing quality control and oversight of the TAPE field teams. Tetra Tech will also provide a community involvement coordinator (CIC) and a field sample coordinator to reside in Troy and assist the project manager and field team leader with daily project tasks. The Tetra Tech field sample coordinator will have primary responsibility for checking and cataloging soil and dust samples at the end of each day and for working closely with the ESAT Troy sample coordinator to ensure that complete, adequate, and secure sample information is collected and transferred to EPA. The detailed responsibilities for these Tetra Tech project personnel are further discussed in Section 5.5.

Tetra Tech will provide six to twelve TAPE field team members stationed in Troy for the duration of the field effort. Some substitution and rotation of field staff on and off the TAPE project are expected, but the field staff will work a minimum of two weeks before substitutions occur. The Tetra Tech field team

leader (Mr. Stockwell) will accompany the field teams on a rotational basis to ensure and verify that the teams are conducting the TAPE activities as described and outlined in this Work Plan. The Tetra Tech field teams may conduct limited TAPE inspections during the evenings or on Saturdays to better accommodate the schedules of Troy property owners. All field team members will be hazardous waste operations certified and be trained to properly handle the health and safety protocols for this project. Additionally, at least one field team member will hold a current Asbestos Hazard Emergency Response Act asbestos inspector training certificate. All field team members will complete on-site training on the TAPE, sample collection, community relations, and health and safety.

On average, a Tetra Tech field team (may consist of two or four persons) will complete one to two TAPE inspections per day, depending on the complexity of the properties inspected. With three field teams, Tetra Tech should complete about 50% of the total number of inspections (1,198) in the 2007 field season. The remaining 50% should be completed in the 2008 field season.

4.2.2.1 Communications

Field team members, with the DEQ Troy Information Center as base, will be provided with multi-channel radios for the duration of field activities. Contact information, including emergency numbers, for all field teams and for TAPE project management personnel in Helena, Montana, will be stored in the DEQ Troy Information Center. In addition, the Montana DEQ TAPE project officer (Ms. Catherine LeCours), ESAT Troy sample coordinator, and EPA Libby Asbestos Superfund Site personnel will be provided with contact information for ready access to the Tetra Tech field teams.

4.2.2.2 Equipment

Appendix C details equipment and supplies Tetra Tech identified as necessary for the TAPE field activities described in this Work Plan. In addition, each Site-Specific Sampling Guidance in Appendix B includes activity-specific equipment lists. The Tetra Tech field team will inspect the equipment and supplies prior to field use to ensure they are in good condition and free of defects.

4.2.2.3 Pre-Field Activities

Before field crews mobilize to Troy for the TAPE field inspections, Tetra Tech will prepare detailed property maps that identify individual Troy properties. Property boundary and other details will be gathered from public databases (cadastral) and projected onto air photographs. Information from the TAPE inspection and sampling activities will be recorded in either a PDA, logbook or field sketch. Requirements for the field sketches are discussed in Section 5.3. Unless otherwise noted in this Work

Plan, all information is to be collected in the PDA. Hard copy forms of the information collected in the PDA are included as an Attachment to Appendix H. The forms programmed into the PDA will be prepopulated with the parcel information before the field teams leave the Tetra Tech Troy field office. The TAPE inspection schedule will be refined as Tetra Tech schedules the inspections at times and dates convenient to the property owners.

4.2.2.4 Field Team Organization

Field teams of two people per team will conduct the TAPE inspections and sampling. This arrangement may be modified to include four persons working on one parcel at the same time, two inside and two outside. At the start of each day, the field teams will meet at the Tetra Tech Troy field office for daily safety and organizational briefings (see Section 4.1 and Appendix A).

Before the morning briefing, the Tetra Tech field team leader with assistance from the CIC and field sample coordinator will have prepared the PDA and packet for each field team to include specific information for each property to be inspected and sampled that day. Each PDA and packet will include:

- Confirmation that the office has a signed access agreement or blank access agreement if occupant provided prior verbal agreement,
- Details of the scheduled inspection date and time, and the name and telephone number of the property owner or the person who will be present for inspection and sampling, if different than the property owner,
- A PDA prepopulated with property-specific data,
- Preprinted property-specific, building, sample point, and sample identification labels
- Numbered field logbook.
- File box containing all necessary paperwork.
- One copy of the property parcel map on an air photo.
- Graph paper for field sketch documentations.
- Hard copy of all field data collection forms as backup in case the PDA fails.

Each field team will have a numbered logbook specific for the Troy project and will be responsible for any additional information included in the logbook. Additional TAPE inspection and sampling supplies (Appendix C) will be kept at the Tetra Tech Troy field office for use by the field teams. The daily briefings will be used to conduct daily health and safety meetings, coordinate daily property inspections, calibrate sampling equipment, and collect supplies. The daily briefing will include a review of any issues or problems that arose the previous day, and will provide an opportunity for field team members to ask

questions and share lessons learned. At the end of each day, field teams will return to the Tetra Tech Troy field office to deliver samples and paperwork to the Tetra Tech field data coordinator, download information from the PDAs, download digital cameras, charge rechargeable equipment, and store field equipment for the evening. Section 6.0 of this Work Plan contains additional logistical details on TAPE data management.

4.2.3 Access Agreements

Approximately one month before TAPE field activities begin, Tetra Tech will assist DEQ with mailing access agreements to every Troy property owner where the property has been identified for inspection and sampling. A cover letter will contain information from DEQ on the proposed sampling and contact information for DEQ Troy Information Center, DEQ, EPA, and the Libby Information Center. The packet will also contain two copies of an access agreement form and a postage-paid envelope for the property owners to return a completed access agreement. The other copy of the access agreement is for the property owner's records. The cover letter will explain the need for the signed access agreement and encourage any property owners who have questions or concerns about the process to contact the designated parties. An example cover letter and access agreement is provided in Appendix D. A separate access agreement will be required for each parcel of land.

The Tetra Tech Troy field team leader and CIC will manage information mailed in from the Troy property owners, including signed access agreements. All signed access agreements will be scanned and downloaded into the Troy project Scribe database where they will become part of the electronic record for the property. A Tetra Tech field team person will follow up with properties where no response has been received. Follow up contacts (in person or by telephone) will explain the purpose of the TAPE, describe the inspection and sampling process, and answer any pertinent questions. Property owners may provide verbal approval and schedule an inspection; therefore, field teams may obtain a signed access agreement immediately prior to a scheduled inspection.

If property owners are not available during the reconnaissance, the field team will revisit each location at least three times, and the field team leader (or designee) will continue to follow up with personal visits and by telephone. After repeated attempts to contact the property owner by the field teams and the field team leader, Tetra Tech will repeat the mailing with a letter describing the attempts made to contact the property owner.

When Tetra Tech has received either verbal approval or a completed and signed access agreement either by mail or from a field team, Tetra Tech will contact the property owner by telephone to schedule a TAPE inspection and sampling visit.

Tetra Tech will make reasonable efforts to find a TAPE inspection and sampling date and time that are convenient for the property owner. TAPE inspections and sampling schedules will include evenings (daylight hours only) and Saturdays, as needed based on the requests of property owners. If property owners respond to the access agreement favorably, but a property is currently uninhabited (for example, it is only seasonally occupied or is currently for sale, or no buildings are present on the property), Tetra Tech will attempt to inspect and sample the property with a designee of the property owner. Properties will not be exempted from inspection or sampling on the basis that they are currently uninhabited, however.

Tetra Tech will not advise property owners of the likely nature of removals at their properties or estimated removal dates during the TAPE scheduling phase, the personal interviews, or the TAPE inspections and sampling. Property owners will be advised that DEQ and EPA will determine removals and schedules after analytical results have been received and evaluated.

Some Troy property owners may be non-responsive or unwilling to sign an access agreement, even when Tetra Tech has attempted to contact them by all reasonable means (telephone, visit to the property, and repeated mailings) to obtain permission for a TAPE inspection and sampling. Tetra Tech will provide DEQ with a list of all Troy properties where the property owner could not be contacted or refused to sign an access agreement at the conclusion of TAPE field activities.

4.3 VERBAL INTERVIEW

The Troy property visit by the TAPE field team will commence with a verbal interview by the field team with the property owner to acquire background information about the property. The field team will interview the property owner using the questions provided in the PDA (Appendix H). Interview topics will include the known or suspected use of VCI or other LA-containing building materials in the house or outbuildings and possible introduction of other sources of LA within or near the property (including garden and landscaped areas and neighboring properties). A unique property identification number (AD-2XXXXX) will be assigned to each individual property that is inspected. Identification numbers for Troy OU7 will begin at 200001 and then go up so they will not overlap with any numbers used at the Libby OU4.

All buildings encountered during the TAPE inspections will be classified as either a primary building (habitable building, for example, a house, apartment, or main commercial space); or a secondary building (non-habitable building, such as garages, shops, sheds, barns, or dog houses). The verbal interview will address all primary and secondary buildings and exterior use areas located on a Troy property. A unique building identification number (BD-2XXXXX) will be assigned to each individual building that is inspected.

4.4 BUILDING INSPECTION, SAMPLE COLLECTION, AND RECORDING PROCEDURES

This section describes the field inspection, sampling, and recording to be completed for each TAPE inspection. Quality assurance and quality control samples are described in Section 5.2.

4.4.1 Indoor Inspection

The field team will visually inspect each building for the presence of VCI and other visible vermiculite. Each field team will have reference samples of VCI and other forms of vermiculite to aide in identification of the material. One team member will access and inspect the attic (if safe, present, and reasonably accessible) and will inspect additional areas where VCI may be exposed in living spaces (crawlspaces, closets, and any wall openings). Tetra Tech anticipates that attic areas will be categorized in various levels of finishing, ranging from completely unfinished spaces with exposed ceiling trusses and framing, to partially finished with some "flooring" provided, to fully finished "livable spaces." The Tetra Tech field team members will only enter the attics if the field team decides it is safe to enter. Team members will only access unfinished attics areas with their head and torso and will remain standing on ladders. Team members may enter partially or fully finished attics to conduct more extensive investigations, if deemed safe.

The second team member will document results in the PDA and will record additional pertinent information in the field logbook. As much as is possible in a non-destructive manner, the visual inspection will include checking under other types of insulation (such as blown-in or fiberglass insulation) for VCI. Visual inspections will not involve opening up walls or ductwork to inspect for VCI within the building wall cavities. The field team will note whether ductwork (including heat/cooling vents) run from the attic to the living space. Visual inspections will not include inspecting the roof.

Attics will be considered reasonably accessible if they can be reached by stairs, hanging stairs, or a non-conductive stepladder (either from the interior or exterior of the building). Attics will be inspected in a manner that, in the judgment of the field team, is not likely to release additional VCI into the living space (exterior access is preferable). The field team will compare exterior roof lines and interior ceiling heights with attic interiors in an effort to identify isolated attic areas that may exist between the roof and the main attic, or between the attic and the interior ceilings. If isolated attics are found, they will be inspected if possible, and barriers between attic areas and access points will be described in the logbook and identified on the field sketch. Whenever possible, attic inspections will also involve inspection of kneewalls (areas where the pitch of the roofline meets the walls). Kneewalls may be used for storage or to improve the finished look of an attic. Kneewalls will be accessed wherever possible, as these areas may provide additional information on construction material. For example, kneewalls may have unfinished floors compared with the finished floors in the rest of the attic.

As detailed in the HASP, decontamination zones will be established during the TAPE project, such as at the base of ladders used to access attic spaces or outside of crawl space entrances. These areas will be covered with two layers of polyethylene sheeting during sampling in the attic or crawl space. After personal and equipment decontamination are complete and polyethylene sheeting removed, decontamination areas will be cleaned of debris and residue using appropriate HEPA vacuuming or wet cleaning procedures. Visitors, including building occupants, will not be permitted to enter the decontamination zone without proper qualifications and authorization.

If potted plants are located inside the primary building, the field teams will note in the logbook whether vermiculite-containing potting soil is present, as this type of soil could affect results of dust sampling.

As described in the HASP (Appendix A), the field team will not be required to access any attics, crawl spaces, or living areas if there is an unacceptable safety hazard, including biological hazards. The field team will not inspect Troy properties for non-VCI and non-LA asbestos. However, damaged or friable suspect asbestos-containing materials observed during the inspection will be noted in the PDAs, locations identified in the field logbook, and a photograph may be taken. This information may be of use in interpreting sampling results and planning potential remediation efforts.

The field team may choose to photo-document specific conditions in the building during the TAPE inspection for future reference. The property owner will be asked for permission before any photographs are taken.

If new or existing damage is present in the home that may result in the exposure of the residents to vermiculite the field team may, after consultation with or assistance from the property owner, install temporary barriers to prevent additional vermiculite from entering the living space. Temporary barriers may include plastic sheeting taped over openings, caulking small cracks, or other minor repairs. Any temporary barrier installed by the field team will be detailed in the logbook.

TAPE inspections will be primarily documented in the PDAs with other information recorded in the field logbooks and on field sketches.

As described in Section 4.3, buildings on a property will be classified as primary or secondary. Every primary and secondary building will be subject to a TAPE inspection, the data will be entered into the PDA, and samples collected.

4.4.2 Indoor Dust Sampling

Dust samples will be collected using microvacuum (microvac) sampling techniques in all primary buildings, regardless of whether VCI or other LA-containing building materials are observed. Asbestos is not visible to the unaided eye and not all sources (historical or current) may be identified during visual inspection. Therefore, dust samples will be collected on every level of every building at all properties within the Troy OU7. Dust samples will be collected following the procedures detailed in CDM-LIBBY-10 (Appendix B) with TAPE-specific modifications detailed below.

The decision to use microvac sampling, rather than wipe sampling, for the TAPE inspection and sampling was based primarily on the need to collect data that are consistent with data collected for the Libby OU4, with improvements where possible. Microvac sampling methods are assumed to collect samples that more accurately measure releasable asbestos fibers and provide a more representative composite dust sample when compared with wipe samples. Each indoor dust sample will be composed of a 10-point composite sample to improve representativeness of the dust sample for each level of the building.

4.4.2.1 Select Sampling Locations

Dust samples will be collected from every level in every primary and secondary building regardless of whether LA contamination was observed during the visual inspection. The TAPE field team will select sample aliquot locations based on the team's visual inspection of the building and estimation of where contaminated dust is most likely to be found. For the TAPE inspections, the dust samples will consist of 10 aliquots distributed among the target areas detailed in CDM-LIBBY-10 (Appendix B) as follows:

- 4 aliquots from Accessible target areas
- 4 aliquots from Infrequent target areas
- 2 aliquots from Inaccessible target areas

Dust samples will not be collected in unfinished or partially finished attics, regardless of the presence or absence of VCI or visible vermiculite contamination. Based on extensive sampling and analytical results from the Libby OU4, VCI found in attics and crawlspaces is assumed to be contaminated with LA fibers (EPA 2003b).

4.4.2.2 Dust Sample Collection

Collecting a microvac dust sample involves vacuuming dust from a surface as detailed in CDM-LIBBY-10 (Appendix B).

The air sampling pumps will be calibrated prior to and following sample collection using a secondary standard rotometer. The flow rate used for sampling will be approximately 2 liters per minute, which provides an approximate air velocity of 100 centimeters per second through the 6.35-millimeter diameter tubing. Each field team will be equipped with a secondary standard rotometer to ensure proper flow rates are maintained. All secondary standard rotometers will be calibrated by a primary standard device such as a Gilibrator or Buck Calibrator the week of April 23, 2007 and the week of July 2, 2007. Results of the calibrations will be documented on calibration charts for each rotometer and managed by the Field Team Leader.

The sampling area for each dust sample point (aliquot) will be 100 square centimeters (cm^2) delineated using a fixed template provided with the sampling cassettes. The sample aliquot will be collected by activating the pump and passing the angled nozzle across the delineated surface for a minimum of two orthogonal passes and 30 seconds without scraping or abrading the surface being sampled. After approximately 30 seconds at the sample aliquot point, the device will be moved to the next location until all aliquots have been collected. The field team will use a stopwatch to record both the 30-second aliquot intervals and the total composite sample time.

Each indoor dust sample will contain 10 sample aliquots; that is, 10 separate 100 cm^2 surfaces will be vacuumed using one cassette. The cassette will therefore contain dust from a total 1,000 cm^2 surface area and a total of approximately 5 minutes of sampling time. The sample will be labeled using the pre-printed sample labels and will be wrapped for return to the Tetra Tech Troy field office. Dust samples

will be labeled with a unique sample identification number "TT-XXXXX" where "TT" indicates a "Troy TAPE" sample. Chain-of-custody procedures will be followed as described in Section 5.5.2.

4.4.2.3 Indoor Soil Sample Collection

Interior Surface Zones include all soil surfaces within the interior of buildings, such as garages, pump houses, sheds, and crawlspaces. Soil will be sampled from interior surface zones regardless of the results of the visual inspection. Soil sampling will include the following steps:

- Determine whether it is safe to enter. If unsafe, note reasons why the space was not sampled in the logbook.
- Identify sample aliquot locations
- Collect sample aliquots
- Inspect each aliquot for the presence of visible vermiculite
- Record sample location on field sketch

TAPE interior surface zone soil samples will be collected as 30-point composites with each aliquot being collected from zero to three inches in depth.

4.4.3 Outdoor Inspection

All areas of the Troy properties that are not covered with buildings will be inspected for vermiculite product in soil and surface materials. The areas of the Troy properties that are not covered by buildings will be grouped into four general types: (1) specific use area, (2) common use area, (3) limited use area, and (4) non-use area. Non-use areas are not sampled, but locations will be noted on the field sketch. A unique use area identification number (UA-2XXXXX) will be assigned to each individual exterior use area that is delineated and inspected. The definition of each exterior use area is presented in CDM-LIBBY-05 in Appendix B of this Work Plan. The procedures for the visual inspection detailed in CDM-LIBBY-05 and CDM-LIBBY-06 are modified for the TAPE. For the purposes of the TAPE, visual point inspections will correlate exactly with soil sample aliquot locations. Therefore, there will be a minimum of 5 and a maximum of 30 visual point inspections per use area. In addition, TAPE field team members will not determine the exact extent of localized vermiculite by evaluating additional point inspections.

The field sketch will show the location of buildings, pavement, exterior use areas, fences, large trees, or other potential obstructions to potential future remediation. Properties that do not have yards, such as commercial properties, will be described as such in the PDA and in the field logbooks; outdoor areas such as paved parking or driveways will still be inspected but samples will not be collected. As best identified by the property owner, property boundary lines will also be noted on the field sketch.

It will not be necessary to delineate the vertical extent of contamination because the default excavation depth for remediation of specific use areas is 18 inches below ground surface (EPA 2003b). Similarly, the default excavation depth for remediation of general yard areas, open space, and driveways is 12 inches below ground surface (EPA 2003b).

The field team may elect to photo-document specific conditions on the property for future reference. The property owner will be asked for permission before photographs are taken.

4.4.4 Outdoor Soil Sampling

After the visual inspection of the property has been conducted, the TAPE field team will collect soil samples from each exterior use area following the procedures described in CDM-LIBBY-05 (Appendix B). There are no TAPE-specific modifications to the soil sample collection procedures. Soil sampling for each exterior use area will include the following steps:

- Identify sample aliquot locations
- Collect sample aliquots and assess the sample aliquots for visible vermiculite
- Record locations on field sketch
- Record sample locations using a global positioning system (GPS) reciever

4.4.4.1 Identify Sampling Locations

A 30-point composite sample will be collected from each exterior use area. TAPE soil samples will be collected as 30-point composites with the sample aliquots collected from similar use areas. Table 4-2 lists the aliquot sampling depth for each type of exterior use area. A minimum of one 30-point composite soil sample will be collected at each Troy property, unless the property has no soil-covered areas (for example, all outdoor areas are paved). The TAPE field team will collect all soil sample aliquots with the minimum amount of disturbance to the surface. Sod will be carefully removed and immediately replaced after sampling and care will be taken to collect soil samples without disturbing growing flowers and vegetables. To ensure consistency, all TAPE field teams will be provided the same training and guidelines, and training will include “brainstorming” potential property scenarios and discussing proposed sampling approaches.

TABLE 4-2
SAMPLING AREA AND DEPTH

Exterior Use Area	Sampling Depth (Inches)
Specific Use Area	0 to 6
Common Use Areas	0 to 3
Limited Use Area	0 to 3
Non-Use Area	Not sampled
Interior Surface Zone	0 to 3

4.4.4.2 Collect Soil Samples

Soil samples will be collected from exterior use areas at properties in the Troy OU7 following the procedures in CDM-LIBBY-05 (Appendix B).

Stainless steel scoops will be used to collect approximately 80 grams of soil sample from the 0 to 3 inch or 0 to 6 inch soil interval at each aliquot location for a total of approximately 2.5 kg of soil. If a small metal shovel is required to assist with sampling to 6 inches, the shovel will be thoroughly cleaned and decontaminated after each sample using procedures outlined in Section 5.1. Each aliquot will be examined for the presence of visible vermiculite. The amount of vermiculite will be categorized as none, low, intermediate, or high using the procedures defined in CDM-LIBBY-06 (Appendix B). Aliquots will then be placed into a stainless steel bowl and mixed. After the sample has been homogenized, approximately 2.5 kg of soil will be placed in one re-closable plastic bag and mixed. During sample collection and mixing, the field team will attempt to shield the soil samples from the wind to avoid potentially losing lighter fractions of the soil to the ambient air. At the conclusion of sampling the stainless steel scoop and bowl will be thoroughly cleaned and decontaminated using procedures outlined in Section 5.1.

The initial re-closable plastic bag will be placed inside a second bag as a precaution. A pre-printed sample label will be affixed to the outside of the inner re-closable bag as well as the sample ID number written on the outside of the inner bag. The outer re-closable plastic bag will also be labeled and marked similarly using the pre-printed sample ID numbers. Soil samples will be labeled with a unique sample identification number “TT-XXXXX” where “TT” indicates a “Troy TAPE” sample. Samples will remain under chain-of-custody procedures as described in Section 5.5.

The TAPE field team will attempt to restore the land surface to its prior condition after sampling, but Tetra Tech will not be responsible for re-laying sod or replanting. For most sample locations, the small area can be replaced with soil from immediately surrounding the excavation and lightly tamped down. In addition, each TAPE field team will have some commercially-available potting soil or quality topsoil available to repair any small excavations that cannot be easily filled with nearby soil materials. It is not envisioned that sampling will require large-scale disturbance of yards, since the sample size required is small.

4.4.4.3 Record Sample Location on Field Sketch and with GPS

A Trimble Geo XT GPS will be used to record the midpoint latitude and longitude for each composite soil sample. The GPS location coordinates will be recorded on the PDA unit and will be associated with the unique UA identification number for the use area.

4.4.5 Photography

Each TAPE field team will have a camera for photo-documenting the conditions at a property, if the conditions are not readily described in writing or if, in the judgment of the field team, photographs may assist in development of a remedial action plan for that property. Permission from the property owner will be obtained before any photograph is taken, other than for photographs taken from the public right of way.

All photographs will be recorded in the field logbook. All photographs will be taken using digital cameras and will be downloaded the same day at the Tetra Tech Troy field office and saved into the Troy project Scribe database. The photographs will then become part of the electronic record for the parcel.

5.0 FIELD QUALITY CONTROL PROCEDURES

Section 5.0 describes the methods and procedures for decontamination, quality assurance samples, field documentation, handling investigation-derived wastes, and maintaining chain of custody of samples and records.

5.1 EQUIPMENT AND PERSONNEL DECONTAMINATION

Dust samples will be collected using a new cassette and a clean template for each sample collected. Sample templates will either be made of hard Plexiglas or other durable material that will be decontaminated after each sample is collected or will be the disposable paper templates supplied with the

cassettes. The air pump and the tubing that connects the cassette to the air pump will be decontaminated between samples with a damp paper towel to avoid transferring dust from one location to another. The paper towels will be placed in a labeled absbestos waste bag.

Stainless steel scoops and bowls will be used for soil sampling; therefore, decontamination of the equipment that is in touch with the soil will be necessary. If a small metal shovel is required to assist with sampling to 6 inches in hard, compacted soils, the shovel will be thoroughly cleaned and decontaminated. Decontamination will occur in the location where the sample was collected and will include spraying the equipment with distilled water followed by drying with paper towels. The water will be allowed to fall on the ground surface within the area just sampled and the paper towels will be placed in a labeled absbestos waste bag.

Visible soil on hands or clothing will be removed by washing with soap and water. Additional personnel decontamination procedures, including requirements for decontamination zones, are described in Section 9.2 of the HASP (Appendix A). PPE will include disposable gloves, disposable protective outerwear, work boots, disposable boot covers, and respirators. The respirators will be cleaned and decontaminated as discussed in the HASP (Appendix A).

5.2 QUALITY ASSURANCE SAMPLES

Detailed information on QC sample collection and frequency is prescribed in the SWQAPP (CDM 2007b). All quality assurance samples will be submitted "blind" (labeled as a collected sample) to the laboratory.

Field Blank Dust Samples - Each field team will collect one field blank dust sample per day. All field blank dust samples will be archived and one field blank dust sample per week will be randomly selected for analysis from the archived samples. Field blank dust samples will be collected at locations selected by the TAPE field team, and will be collected by attaching a cassette to the pump and pumping for 30 seconds to 1 minute at the same rate as for dust sample collection. However, the end of the cassette will be exposed to indoor air at the selected sampling location, rather than passed over a surface of any kind. Data for the field blank dust samples will be evaluated to assess whether a potential exists for airborne asbestos to cause analytical detections of asbestos in dust, or for cross-contamination to occur during sampling. Results of field blank dust samples will not affect field sampling procedures and therefore the results do not need to be communicated to the field team for corrective action.

Dust Lot Blank Samples - Dust lot blank samples will be submitted to the laboratory for each lot of cassettes received from the supplier. Data for dust lot blank samples will be used to evaluate whether cartridges were received asbestos-free from the supplier. Tetra Tech will not use a cassette from a given lot until the dust lot blank results confirm the cartridges are asbestos-free. The Tetra Tech TAPE QA/QC Manager will be responsible for the cassette clearance and usage. All cassette lots will be managed by the Tetra Tech TAPE QA/QC Manager inside the office area of the DEQ Troy Information Center until clearance results have been confirmed. After the Tetra Tech TAPE QA/QC Manager receives acceptable results from a lot of cassettes, the manager will write "ok to use" and the date on the outside of the box and then place the box in the equipment shed for the field teams to use.

Equipment Blanks - Soil field equipment blanks will be collected at a rate of one per calendar week (Monday through Sunday) of sampling per field team. Field equipment blanks will be collected by pouring distilled water over the sampling equipment into a decontaminated stainless steel sampling bowl, pouring the rinse water from the bowl into a sample bottle, placing the sample bottle in a re-closable plastic bag, and submitting it for analysis by method EPA 100.2, modification 20. Data from field equipment blank samples will be used to evaluate whether the decontamination procedures result in sampling equipment that is asbestos-free. Soil field equipment blank samples with elevated results may indicate inadequate equipment decontamination procedures. These results will be communicated to the field immediately upon receipt such that corrective action can be implemented.

Dust Field Duplicates - Dust field duplicate samples will be collected at a frequency of one sample per 20 composite dust samples or a rate of 5 percent. Dust field duplicate samples will be collected by locating a second sampling template adjacent to every original sample aliquot location within the building level. Each duplicate aliquot location will be sampled using the procedures described in 4.4.2. Each duplicate dust sample will contain the same number of sample aliquots as the original sample and will be collected from aliquot locations adjacent to the aliquot locations for the original sample. Data for dust field duplicates will be used to evaluate the potential variability in LA concentrations in a building. These data will not be used to evaluate precision in sampling or analytical techniques. Results of dust field duplicate samples will not affect field sampling procedures and therefore the results do not need to be communicated to the field team for corrective action.

Soil Field Duplicates - Soil field duplicate samples will be collected at a frequency of one sample per 20 composite soil samples or a rate of 5 percent. Field duplicate samples will be collected as samples co-located in the same exterior use area (yard or landscaped area, for example) and will contain the same number of sample aliquots, but will be collected from adjacent aliquot locations. Data for soil field

duplicates will be used to evaluate the potential variability in LA concentrations in a specific exterior use area. These data will not be used to evaluate precision in sampling or analytical techniques. Results of soil field duplicate samples will not affect field sampling procedures and therefore the results do not need to be communicated to the field team for corrective action.

5.3 FIELD DOCUMENTATION

Example PDA field forms are provided in Appendix H. Examples of other field forms are provided in Appendix E. Before the TAPE field activities begin, all members of the Tetra Tech field team will receive the same training on implementation of this Work Plan in general and on use of the PDA forms in particular. Property owner interviews, property inspections, and sample collections will be conducted using the PDA to ensure consistency between properties and between TAPE field teams. Use of the PDA will also allow compilation of TAPE-derived data into the Troy project Scribe database prior to transfer to the EPA Libby Data Reporting Tables (see Section 5.5).

Any additional information that is not recorded on field forms will be recorded in the TAPE field logbooks or on field sketches. Each logbook issued to a field team will be numbered with a prefix of TR-XXXX. Each field team will maintain a field logbook for recording the date and time of each property inspection, the property ID, building ID, use area ID numbers, the number and type of samples collected at the property including sample ID numbers and any other pertinent information. A new page will be started in the field logbook for each property. The field logbook will serve as an independent (backup) record for all activities conducted and samples collected at a property, in the event that the PDA data are lost or corrupted. The field logbook will also be used to record additional observations of the field team that relate to potential remedial action at a property, such as locations, quantities and types of suspect asbestos-containing material that is not VCI or LA, and access limitations that were not noted in the PDA. The field logbooks will be scanned into a portable data format (PDF) and stored as part of the electronic record for each property.

Information will also be recorded on the individual field sketches. Property maps consisting of aerial photographs will be provided for reference; however, the quality of the initial photographs does not allow for use as a base map for each property. Field sketches will show the locations of any observed VCI (in accordance with CDM-LIBBY-06) and LA-containing rock, primary and secondary buildings, and the outdoor sample (including general subsample) locations. The field sketches will be scanned into a PDF format and stored as part of the electronic record for the property.

Field sketches will be on 8- inch by 11-inch, pre-printed graph paper. Exterior property sketches, entitled

Field Diagram of Property Yard will be mandatory for each property inspected. Additional exterior drawings may depict complex use areas or other property details. Interior building drawings are optional.

At the top of each drawing the field team will include the AD property number, the date, and the initials of the field team members completing the survey. All drawings will show:

- North arrow for orientation
- Overall property dimensions
- Location, dimension and corresponding building identification number (BD) of primary and secondary buildings
- Location, dimension and corresponding use area (UA) identification number of specific, common, limited and non-use areas
- Corresponding sample identification numbers (TT)
- Location and dimension (if applicable) of other features such as stock piles, driveway(s), parking areas, walkways, trees, and fences

5.4 CONTAINMENT AND DISPOSAL OF INVESTIGATION-DERIVED WASTE

Investigation-derived waste will include used wet wipes, wet paper towels, disposable gloves, used respirator cartridges, used plastic tubing, disposable protective outerwear, plastic floor coverings, and other minimal waste. It is possible, but not likely, that these investigation-derived waste materials may contain some asbestos. Therefore, all investigation-derived waste will be double-bagged in appropriate asbestos bags, labeled with asbestos labels, and stored in an approved containment area at the Tetra Tech Troy field office until it can be properly disposed of at an approved landfill (Lincoln County outside of Libby). Non-sampling waste generated by the TAPE field teams, such as food containers and waste paper, will be separately bagged and properly disposed of as solid waste.

5.5 RECORD KEEPING AND CHAIN OF CUSTODY

At the end of each day, or more often if required, the TAPE field teams will return to the Tetra Tech Troy field office to download the PDA and transfer the dust, soil, and QC samples and copies of the appropriate logbook pages to the Tetra Tech sample coordinator (or the coordinator's designee). Digital photographs will also be downloaded daily to a computer at the Tetra Tech Troy field office. Photographs will be labeled and downloaded into the Troy project Scribe database based on property, use area, and building ID numbers. Individual photographs will not be routinely printed from the Tetra Tech Troy field office.

An individual file (both paper and electronic) will be maintained for each property inspected. Originals of all field forms will be kept in each individual property file in the Tetra Tech Troy field office for the duration of the TAPE project so that information is available if questions arise. Scanned PDF copies of all field forms and appropriate logbook pages, and digital photographs will be stored in each individual electronic property file. A backup electronic copy of the Troy Scribe database and individual electronic property files will be stored in the Tetra Tech office in Helena, Montana, and updated periodically for the duration of the sampling, inspection, and reporting phases of the TAPE project. Copies of all field sketches, QA/QC records, and field logbooks will be available on request at any time during the TAPE project to DEQ, EPA, or to the Troy property owners.

After the PDA electronic information is downloaded to the Troy Scribe database, from the TAPE field teams, the Tetra Tech field sample coordinator will check all building, use area, and sample ID numbers for accuracy. The Tetra Tech field sample coordinator will then print out a hard copy of the chain-of-custody form and store these records with the associated dust and soil samples collected for the Troy properties. The chain-of-custody report will be transferred to the ESAT Troy sample coordinator.

Until samples have been transferred to the ESAT Troy sample coordinator, all TAPE samples will be securely held by Tetra Tech. Samples may be stored in storage bins (separate for dust and soil) within locked vehicles or in a secured (locked) area of the Tetra Tech Troy field office. All TAPE samples collected from the Troy properties, including QC samples, will be transferred to the ESAT Troy sample coordinator at least on a monthly basis. The ESAT Troy sample coordinator will provide Tetra Tech with a copy of the released chain-of-custody. An example chain-of-custody form is in Appendix E. The ESAT Troy sample coordinator will then transfer the samples to the on-site laboratory for preparation and then to an off-site laboratory for analysis.

5.6 SAMPLE MANAGEMENT

At the end of each day the field teams will transfer all samples to the Troy Tetra Tech field sample coordinator. Field teams will complete, sign, and place a custody seal on each individual sample collected that day. Each sample team will have separate storage bins to house soil and dust samples in their vehicles during the day. The field teams will place their samples into numbered bins in the Tetra Tech field office (equipment shed) and write the corresponding number on the Sample Coordinator Checklist form (Appendix E). The Troy field sample coordinator will then print chain-of-custody forms for each bin. The field team will sign the chain-of-custody and place in the corresponding bin. The field

sample coordinator will store the samples in a secure storage area until the samples are transferred to the ESAT sample preparation laboratory under a chain-of-custody.

5.7 MODIFICATIONS

The field procedures will be continually monitored to ensure that the objectives of the Troy OU7 project are accomplished. There may be circumstances where modification of the procedures described in this TAPE is necessary to complete project objectives for a property or building. The DEQ Project Officer, EPA Remedial Project Manager, Tetra Tech Project Manager, or member of the Tetra Tech field team may request modifications to the approved procedures. Routine modifications (e.g., could not reach required depth of soil sample) will be available for selection on the PDA. All other modifications will be documented on the Record of Modification form in Appendix E prior to completion of the work. If the modification impacts a single property, the field team will complete the modification and the field team leader or DEQ project manager will approve the modification. If a project-wide modification is necessary, the modification form will be completely filled out and the requested modification will be described in writing to the DEQ Project Officer. The DEQ Project Officer will then, if necessary, consult with the EPA Remedial Project Manager and approve or deny the modification. The Tetra Tech Project Manager or field team member will not implement the modification until verbal or written approval is granted by the DEQ Project Officer. If verbal approval is provided, the Tetra Tech Project Manager or field team member will note on the modification form when the approval occurred and the DEQ Project Officer will sign the approval form at the earliest available time. All Record of Modification forms will be housed in the DEQ Troy Information Center. If the modification is specific for a single parcel, the form will be scanned and located in the electronic file for that parcel.

6.0 DATA MANAGEMENT

Data management during the inspection and sampling will be under the supervision of the Tetra Tech TAPE field sample coordinator in the Tetra Tech Troy field office. The Data Management Work Plan (Appendix H) includes the details of the data management procedures and hard-copy pages of the PDA forms.

7.0 QA/QC PROCEDURES

The TAPE quality objectives, QC checks and samples, and audits completed for the TAPE project are described in the sections below. Field quality control procedures are described in Section 5.0 above. The Soil Sample Preparation Work Plan is in Appendix F and laboratory QA/QC procedures are in Appendix G.

7.1 QA/QC OBJECTIVES

The quality objectives of the TAPE project are to obtain 100 percent usable and accurate data. These data will be achieved through inspection and sampling using standardized PDA data entry procedures, auditing field operations, observing chain-of-custody procedures, and analyzing field quality control samples and laboratory quality control samples. The DQOs are further discussed in Section 3.0 of this Work Plan.

7.2 INTERNAL QC CHECKS

When laboratory analytical data are received, Tetra Tech will conduct a thorough quality review of those data. Tetra Tech will review data from both laboratory QC samples described below and field QC samples described in Section 5.2. Standard protocols exist for validation of soil samples analyzed by polarized light microscopy for asbestos and will be followed. Standard protocols do not exist for validation of dust samples for asbestos; however, DEQ and Tetra Tech will follow the QC review procedures for dust data established at the Libby Asbestos Superfund Site (Syracuse Research Corporation 2006). DEQ and Tetra Tech will prepare validation and review packages for all TAPE data.

Dust and soil samples will be analyzed by one of the contract laboratories following Libby Asbestos Superfund Site protocols, including EPA's most recent protocols relating to QA/QC for the Libby Asbestos Superfund Site. As such, the QA/QC protocols followed by the laboratories are not within Tetra Tech's immediate control.

Laboratory QA/QC samples and standard protocols that the contract laboratory will perform for routine analysis will include appropriate laboratory procedures for the analyses of the following sample types:

- Preparation of duplicate samples
- Preparation of laboratory equipment blanks (grinding and other equipment)
- Method blank samples
- Matrix spike/matrix spike duplicates
- Laboratory control samples/laboratory control duplicates

- Standard reference material
- Surrogates

Data will be entered into the EPA Libby Data Reporting Tables only after a 100 percent QC review of the data.

7.3 AUDITS, CORRECTIVE ACTIONS, AND QA REPORTS

Field audits will be an integral part of Tetra Tech's field operations for the duration of the TAPE project. Field audits and corrective actions will be the responsibility of EPA and the Tetra Tech QA/QC manager. (See Section 2.0 and Table 2-1 for designated key project personnel.) EPA Region 8 personnel have stated their intent to audit the TAPE project during each field season. The field audit forms will be housed in the Troy field office for the duration of the project.

7.3.1 Field Inspections and Sampling Procedures Audits

The Tetra Tech QA/QC manager will be responsible for audits of TAPE field inspections and sampling procedures. Audits will be conducted weekly for the duration of the TAPE. Audits will consist of the QA/QC manager or his designee attending a Troy property inspection and sampling event and observing the TAPE field team's activities. The field team will not be warned of the audit. The auditor will compare the field team's activities with the protocols provided in this Work Plan and the attached project-specific guidance and evaluate compliance with the protocols using the audit form provided in Appendix E. After the audit, the auditor will provide the completed audit form to the DEQ, EPA, and Tetra Tech project managers.

7.3.2 Corrective Action Procedures

The QA/QC auditor may use his or her discretion to provide immediate verbal feedback to the TAPE field team, if necessary, to ensure that deficiencies are fixed as quickly as possible. The Tetra Tech field team leader and QA/QC manager will review the report with the TAPE field team within 48 hours of the audit to correct any deviations or deficiencies. If any deviations or deficiencies were noted, the field team will be audited again within one week of the original audit to ensure that any deficiencies have been fixed. If a field team member is rotated off the project after deviations or deficiencies were noted, the field team members will be audited again within one week of returning to Troy.

If gross deficiencies are noted, the Tetra Tech QA/QC manager will determine whether re-inspection or re-sampling of any Troy properties is required. Re-inspection or re-sampling will be required only if the TAPE field team failed to correctly identify VCI during inspection, collected samples incorrectly, or collected a grossly inadequate number of samples.

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APPENDIX A

SITE-SPECIFIC HEALTH AND SAFETY PLAN
TROY ASBESTOS PROPERTY EVALUATION

Health and Safety Plan

for

Troy Asbestos Property Evaluation (TAPE)

HEALTH AND SAFETY PLAN

Troy Asbestos Property Evaluation

Contract No.	:	DEQ 402014-TO41
	:	
Date Prepared	:	7/2/07
Prepared by	:	Tetra Tech EM Inc. (Tetra Tech)
Tech Project Manager	:	J. Edward Surbrugg, Ph.D.
Telephone No.	:	(406) 442-5588

REVIEWS AND APPROVALS

CLIENT NAME:
CONTRACT NO.:

We the undersigned have read and approve of the health and safety guidelines presented in this health and safety plan for on-site work activities for the Troy Asbestos Property Evaluation project.

Name	Signature	Date
Richard L. Ecord Jr., CIH, CSP Tetra Tech EM Inc. (Tetra Tech) Health and Safety Representative (404) 225-5527		3/14/2007
J. Edward Surbrugg, Ph.D. Tetra Tech Project Manager		

This certifies that Tetra Tech has assessed the type, risk level, and severity of hazards for the project and has selected appropriate personal protective equipment for site personnel in accordance with Occupational Safety and Health Administration Title 29 of the *Code of Federal Regulations,* Part 1910.132.

Certified by		
Richard L. Ecord Jr., CIH, CSP Tetra Tech Technical Reviewer		3/14/2007

EMERGENCY INFORMATION
EMERGENCY CONTACTS AND ROUTE TO HOSPITAL

Emergency Contact	**Telephone No.**
U.S. Coast Guard National Response Center	(800) 424-8802
Montana Department of Emergency Services	(406) 431-0411
InfoTrac Chemical Monitoring System	(800) 535-5053
Fire Department	911
Police Department	911
Tetra Tech EM Inc. Personnel:	
Human Resource Development: Amy Clark	(626) 351-4664
Health and Safety Representative: Rick Ecord	(404) 225-5527
Office Health and Safety Coordinator: Sandra Hertweck	(406) 442-5588, ext. 221
Project Manager: J. Edward Surbrugg	(406) 442-5588, ext. 230
Site Safety Coordinator: Mark Stockwell	(208) 263-4524
Alternate Site Safety Coordinator: (Bryan Erickson)	(816) 225-4030
Client Contact: Catherine LeCours	(406) 841-5040
Client Title: Montana DEQ Project Officer	

Medical Emergency

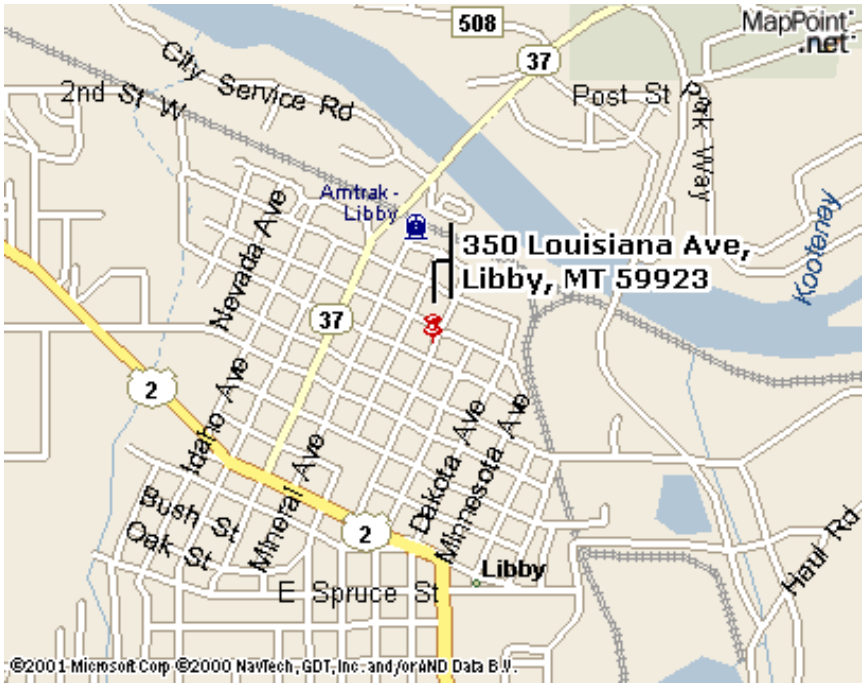
Hospital Name:		St. John's Lutheran Hospital
Hospital Address:		350 Louisiana Avenue Libby, MT 59923
Hospital Telephone No.:	General – 406-293-0100	Emergency – 911
Ambulance Telephone No.:		911

Route to Hospital: (see next page, hospital route map)

1. Routes will differ from each sample site; however, the route from the main east/west highway (US-2) is as follows:
2. Follow Missouri Avenue (US-2) east for 17.0 miles to Libby, Montana
3. Turn left at California Avenue for 0.3 miles
4. Turn right at West 4th Street for 0.2 miles
5. Turn left at Louisiana Avenue for 161 feet.

Note: This sheet must be posted on site.

EMERGENCY INFORMATION
HOSPITAL ROUTE MAP



Note: This sheet must be posted on site.

EMERGENCY INFORMATION

EMERGENCY CONTACTS AND ROUTE TO HOSPITAL

Medical Emergency (secondary – use for major emergency only)	
Hospital Name:	St. John's Lutheran Hospital
Hospital Address:	350 Louisiana Avenue, Libby, MT 59923
Hospital Telephone No.:	Emergency – 911 or General – 406-293-0100
Ambulance Telephone No.:	911

Route to Hospital: (see next page hospital route map)

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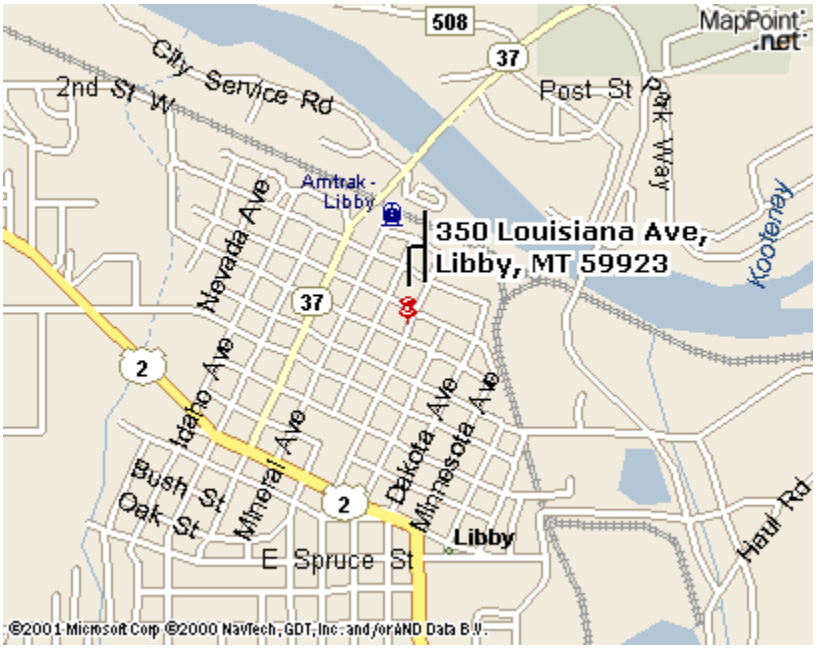
EMERGENCY INFORMATION

HOSPITAL ROUTE MAP



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1.0 INTRODUCTION

This document addresses items specified under Occupational Safety and Health Administration (OSHA) Title 29 of the *Code of Federal Regulations* (CFR), Part 1910.120 (b), "Final Rule." and 29 CFR 1910.1001. This health and safety plan (HASP) will be available to all on-site personnel who may be exposed to hazardous on-site conditions, including Tetra Tech EM Inc. (Tetra Tech) and subcontractor personnel, and all site visitors and regulatory agency representatives. The site-specific health and safety provisions in this document have been developed for use during the Troy Asbestos Property Evaluation (TAPE) inspection and sampling

This HASP defines requirements and designates protocols to be followed during the TAPE inspection and sampling. All personnel on site, including Tetra Tech and subcontractor employees and site visitors, must be informed of site emergency response procedures and any potential health or safety hazards associated with on-site activities. This HASP summarizes potential hazards and defines protective measures planned for activities at the site.

This plan must be reviewed and approved by the Tetra Tech health and safety representative (HSR) or a designee and the Tetra Tech project manager (see the Reviews and Approvals form after the contents in this document). All personnel must sign the Compliance Agreement form in Appendix A before they enter the site. Protocols established in this HASP are based on site conditions and health and safety hazards known or anticipated to be present and on available site data. This plan is intended solely for use during proposed activities described in the corresponding site-specific work plan. Specifications are subject to review and revision based on actual conditions encountered in the field during site activities. The Tetra Tech project manager and the Tetra Tech HSR must approve significant revisions to this plan. Tetra Tech employees must also follow safety requirements taught during safety training and described in the Tetra Tech, Inc., "Health and Safety Manual" (1999).

2.0 HEALTH AND SAFETY PLAN ENFORCEMENT AND PERSONNEL

This section describes responsibilities of project personnel, summarizes requirements for subcontractors and visitors who wish to enter the site during the survey and sampling, and discusses HASP enforcement.

2.1 PROJECT PERSONNEL

The following personnel and organizations are associated with planned activities at the site. The organizational structure will be reviewed and updated as necessary during the course of the project.

Name/Title	Responsibility	Telephone No.
Client Representative:		
Ms. Catherine LeCours	Montana Department of Environmental Quality (DEQ) Representative	(406) 841-5040
Tetra Tech Personnel:		
J. Edward Surbrugg	TAPE Project Manager	(406) 442-5588 x 230
Mark Stockwell	Site Safety Coordinator (SSC)	(208) 263-4524
Mark Stockwell	Field Team Leader	(208) 263-4524

The Tetra Tech project manager, contract manager, SSC, and field team leader will be responsible for implementation and enforcement of the provisions of this HASP, including completion of all applicable forms provided as appendices to this health and safety plan. Their duties and the expectations for Tetra Tech employees are described in the following sections.

2.1.1 Project Manager and Field Manager

The Tetra Tech project manager has ultimate responsibility for implementing the requirements set forth in this HASP. Some of this responsibility may be achieved through delegation to site-dedicated personnel who report directly to the project manager. The project manager shall regularly confer with site personnel on compliance with safety and health requirements.

The Tetra Tech field team leader will oversee and direct field activities and has day-to-day responsibility for implementing the HASP. The field manager will report directly to the project manager any health and safety-related issues.

2.1.2 Site Safety Coordinator

The Tetra Tech SSC will be appointed by the project manager and will be responsible for field implementation of tasks and procedures contained in this HASP, including air monitoring, establishing a decontamination protocol, and ensuring that all personnel working on site have signed the Daily Tailgate Safety Meeting form (Form HST-2) and the Compliance Agreement (Form HSP-4) (see Appendix A). The SSC will have advanced field work experience and be familiar with health and safety requirements specific to the project. The SSC will also maintain the Daily Site Log (Form SSC-1 in Appendix A).

2.1.3 Health and Safety Representative

The Tetra Tech HSR is responsible for administration of the company health and safety program. The HSR will act in an advisory capacity to project managers and site personnel for project-specific health and safety issues.

2.1.4 Tetra Tech Employees

Tetra Tech employees are expected to fully participate in implementing the site HASP by obtaining necessary training, attending site safety meetings, always wearing designated personal protective equipment (PPE), complying with site safety and health rules, and advising the Tetra Tech SSC of health and safety concerns at the site.

2.2 SUBCONTRACTORS

Subcontractors will follow and adhere to the same guidelines stated in Section 2.1.4, however they should provide their own health and safety documentation for the protection of their employees. Tetra Tech has prepared this HASP solely for the protection of Tetra Tech employees, and assumes no responsibility for the protection of others. Subcontractors must supply their own PPE, training, medical monitoring, any any other items necessary for compliance with OSHA and other pertinent regulations.

2.3 VISITORS

All site visitors will be required to read the HASP and sign the Compliance Agreement form (see Appendix A). Visitors will be expected to comply with relevant OSHA requirements. Visitors will also be expected to provide their own PPE as required by the HASP. Visitors who have not met OSHA

requirements for training, medical surveillance, and PPE are not permitted to enter areas where exposure to hazardous materials is possible.

2.4 HEALTH AND SAFETY PLAN ENFORCEMENT

This HASP applies to all site activities and all personnel working on the TAPE project. HASP enforcement shall be rigorous. Violators of the HASP will be verbally notified on first violation, and the Tetra Tech SSC will note the violation in a field logbook. On a second violation, the violator will be notified in writing, and the Tetra Tech project manager and the violator's supervisor will be notified. A third violation will result in a written notification and the violator's eviction from the site. The written notification will be sent to human resources development and the HSR.

Personnel will be encouraged to report to the SSC any conditions or practices that they consider detrimental to their health or safety or that they believe violate applicable health and safety standards. These reports may be made orally or in writing. Personnel who believe that an imminent danger threatens human health or the environment are obligated to remove themselves from the area or the hazardous condition and warn all other personnel of the source of the danger. The hazardous condition or matter will be brought to the immediate attention of the SSC for resolution.

At least one copy of this HASP will be available to all site personnel at all times. The SCC will discuss minor changes in HASP procedures at the beginning of each workday at the daily tailgate safety meeting. Significant plan revisions must be discussed with the HSR and project manager, and approved by the HSR.

3.0 SITE BACKGROUND

The TAPE inspection and sampling project will include collecting samples of dust and soil from private and public property to evaluate the magnitude and extent of asbestos contamination. The following sections describe the TAPE site, its history, and activities planned for this project. The location of Troy, Montana, can be found in Figure 1.

FIGURE 1 – SITE LOCATION

3.1 SITE DESCRIPTION

Troy, Montana, is located 18 miles from Libby, Montana. Through 1990, a vermiculite mine and associated processing operations in Libby produced a large amount of the world supply of vermiculite. The vermiculite deposit is contaminated with a form of amphibole asbestos (Libby amphibole). Asbestos is a known carcinogen and is associated with a multitude of respiratory health effects, including asbestosis, lung cancer, and mesothelioma. For decades, contaminated vermiculite and associated waste materials has been ubiquitous in the community while the mine operated and after its closure. Many of the mine workers lived in Troy and commuted to the mine to work because it is close to Libby. Workers were exposed to contaminated materials at the mine and processing facilities and transported contaminated dust to their homes on clothes and equipment. Vermiculite and contaminated waste rock in varying forms was used in soils (as fill or an amendment), construction materials, and for insulation in various locations in Troy.

In 1999, U.S. Environmental Protection Agency (EPA) Region 8 dispatched an emergency response team to investigate media reports that described a high rate of asbestos-related deaths in Libby. Originally believed to be a problem limited to the mine workers, the scope has recently increased. Subsequent environmental investigations have found many areas in Libby with LA contamination. EPA began Superfund emergency response removal actions in Libby in 2000 that are ongoing through 2007. Properties in Troy are being investigated to evaluate whether LA-contaminated vermiculite has been transported to these sites and if they exist at concentrations that would pose health risks to human health.

3.2 PLANNED ACTIVITIES

Activities to be performed during the TAPE include the following:

Indoor Inspections: The two-person sampling team will visually inspect each structure for the presence of vermiculite-containing insulation (VCI).

Indoor dust sampling: Dust samples will be collected using microvac sampling techniques in all primary and secondary structures.

Outdoor Inspection: All areas of a property that are not covered with structures or special use areas will be visually inspected for vermiculite product in soil and surfacing materials.

Outdoor Soil Sampling: After conducting the visual inspection of the property, the sampling team will collect soil samples. Soil samples will be collected at all properties, regardless if visual VCI or LA is observed.

These tasks are described in detailed in Section 4 of the TAPE work plan.

4.0 EVALUATION OF SITE-SPECIFIC HAZARDS

Field activities and physical features of the site may expose field personnel to a variety of hazards. This section provides information on potential hazards related to site activities and the nature of effects from hazardous materials.

4.1 CHEMICAL HAZARDS

Tremolite-actinolite asbestos is the only potentially hazardous substance anticipated to be encountered during site activities. Potential routes of exposure, exposure limits, and the toxic characteristics of asbestos are listed in Table 4-1. The primary route of exposure is inhalation; however, secondary potential routes of exposure include dermal (skin) contact and ingestion. Asbestos may also contaminate equipment, vehicles, instruments, and personnel. The overall health threat to Tetra Tech employees from exposure to asbestos during this project is uncertain because (1) actual concentrations that personnel could be exposed to cannot be predicted until assessments and sampling activities begin, (2) the actual duration of exposure is unknown, and (3) the effects of low-level exposure to a mixture of chemicals or asbestos cannot be predicted.

Specific information on potential chemical hazards at the site is provided in Table 4-1. Table 4-2 provides a task hazard analysis of the activities planned and listed in Section 3.2.

Tetra Tech will not bring any potentially hazardous materials to the site during the field activities. Because of the nature of asbestos sampling, all PPE and monitoring equipment can be decontaminated using soap and water. Air monitoring equipment to be used during this project will be calibrated without the use of hazardous materials.

TABLE 4-1

POTENTIAL CHEMICAL HAZARDS
TAPE INSPECTION AND SAMPLING PROJECT

Chemical	Exposure Limits and IDLH Level	Exposure Routes	Toxic Characteristics
Asbestos	OSHA PEL: 0.1 fiber/cm^3 (8 hour TWA) OSHA Excursion Limit: 1 fiber/ cm^3 (30 minute exposure) ACGIH TLV: 0.1 fiber/cm^3 NIOSH REL: 0.1 fiber/ cm^3 IDLH: Not Established	Inhalation (primary), ingestion, skin or eye contact	Lung cancer, mesothelioma, Asbestosis (chronic exposure): dyspnea (breathing difficulty), interstitial fibrosis, restricted pulmonary function, finger clubbing; irritation eyes

Notes:

ACGIH American Conference of Governmental Industrial Hygienists
IDLH Immediately dangerous to life or health
cm^3 Cubic centimeter
OSHA Occupational Safety and Health Administration
PEL Permissible exposure limit
ppm Part per million
TLV Threshold limit value
TWA Time weighted average

Sources: ACGIH. "Threshold Limit Values and Biological Exposure Indices for 1998." Latest edition.

National Institute for Occupational Safety and Health. 2004. "Pocket Guide to Chemical Hazards." U.S. Department of Health and Human Services. U.S. Government Printing Office. Washington, DC. June.

TABLE 4-2

TASK HAZARD ANALYSIS
TAPE Inspection and Sampling Project

Task	Potential Hazard	Controls	Initial Level of Protection	Upgraded Level of Protection
Task 1 – Interior Attic Evaluations and dust sampling	Potential asbestos exposure. Physical hazards include confined space entry; and slip, trip, fall, and overhead hazards. Risks associated with ladder use. Risks associated with falls between roof trusses.	Use of buddy system at all times, use of flashlights when necessary, hazard awareness. Inspections will be conducted to limit the potential for exposure. Performance of personal air monitoring at selected locations. Follow Safe Work Practices (SWP).	Level C protection when accessing all attic spaces	Level C protection will be required when accessing all attic spaces
Task 2 – Exterior yard and open area inspections, and soil sampling	Potential asbestos exposure. Physical hazards include slip, trip, and falls.	Use of buddy system and hazard awareness. Follow SWPs including the use of PPE whenever LA is observed, proper decontamination procedures, physical and biological safety procedures, and emergency and communication procedures.	Level C protection until NEA has been obtained. Level D protection for general soil sampling, although respirators will be required whenever LA or VCI is observed. Disposable booties will be required whenever sampling in loose soil or special use areas.	Potential for upgrade to level C protection may be necessary using P-100 cartridges. Full or ½ face respirator can be used. Decision to upgrade to be made by the SSC/field manager based on site conditions, monitoring results, and presence of friable asbestos.

The following steps will be taken o reduce the potential for inhaling asbestos:

- Personnel will avoid sampling methods and procedures that would render nonfriable asbestos-containing material (ACM) friable, such as not wetting soils prior to sampling.
- The level of PPE shall be upgraded from level D to level C at any time that sampling conditions warrant, as determined by the SSC or field manager.

4.2 PHYSICAL AND BIOLOGICAL HAZARDS

Physical and biological hazards associated with site activities present a potential threat to on-site personnel. Dangers are posed by slippery surfaces, unseen obstacles, poor illumination, use of ladders, and low overhead clearance, as well as insects, Hantavirus, and hostile animals.

Injuries resulting from physical and biological hazards can be avoided by using safe work practices (SWP). To maintain a safe workplace, the SSC will conduct and document regular safety inspections and will make sure that all Tetra Tech workers and visitors are informed of any potential physical and biological hazards related to the site. Physical and biological hazards that have been identified at this site include the following:

- Spiders, including brown recluse and black widow
- Potential disease agents from animal/bird feces, including Hantavirus and Histoplasmosis
- Hostile domestic or stray animals, or building occupants
- Use of ladders and other equipment to access attics and areas for sample collection
- Trips, slips, falls in yards and open areas
- Heat stress
- Cold stress
- Fall hazard (from ladders and through roof trusses in attics)
- Potential confined space entry – no permits are anticipated to be necessary for sampling, however, occupants will be asked to provide information on any known or potential CO hazards in basements, crawl spaces or other areas of the properties. If present, the Tetra Tech field team will not enter these areas.

5.0 TRAINING REQUIREMENTS

All on-site personnel who may be exposed to hazardous conditions, including Tetra Tech and subcontractor personnel and site visitors who will participate in on-site activities, will be required to meet training requirements outlined in 29 CFR 1910.120, "Hazardous Waste Operations and Emergency Response." And 29 CFR 1910.1001. All personnel and visitors entering the site will be required to review this HASP and sign the Compliance Agreement form (HSP-4), and site workers will be required to sign the Daily Tailgate Safety Meeting form (HST-2) (see Appendix A).

Personnel collecting asbestos samples will, at a minimum, be 40-hour HAZWOPER trained, have current 8-hour HAZWOPER refresher training, respiratory protection trained, asbestos awareness trained, and have a copy of these certificates on their person at all times they are on-site performing work. Additionally, a copy of a current respirator fit-test will be on-site for each employee performing work.

The field team will also received a training module on confined space issues during the site-specific health and safety training prior to beginning the survey. All staff will be trained on how to identify confined spaces, and what defines a permit required confined space. As some of the attic spaces and crawl spaces meet the traditional definition of a confined space, but will need to be inspected or sampled, Tetra Tech will restrict access to spaces smaller than 30-inches high and 10-by 10-feet in size. Tetra Tech will also have a CO/oxygen monitor available for sampling as an added precaution prior to access, if deemed necessary.

Before on-site activities begin, the Tetra Tech SSC will present a briefing for all personnel who will participate in on-site activities. The following topics will be addressed during the pre-work briefing:

- Names of the SSC and the designated alternate
- Site history
- Tasks
- Hazardous chemicals that may be encountered on site
- Physical hazards that may be encountered on site
- PPE, including type or types of respiratory protection to be used for work tasks
- Training requirements
- Action levels and situations requiring upgrade or downgrade of level of protection

- Site control measures, including site communications, and SWPs
- Decontamination procedures
- Emergency communication signals and codes
- Personnel exposure and accident emergency procedures (in case of falls, exposure to hazardous substances, and other hazardous situations)
- Emergency telephone numbers
- Emergency routes

Any other health and safety-related issues that may arise before on-site activities begin will also be discussed during the pre-work briefing.

Issues that arise during on-site activities will be addressed during tailgate safety meetings to be held daily before the workday or shift begins that will be documented in the Daily Tailgate Safety Meeting form (Form HST-2 in Appendix A). Any changes in procedures or site-specific health and safety-related matters will be addressed during these meetings.

6.0 PERSONAL PROTECTION REQUIREMENTS

The levels of PPE to be used for work tasks during the TAPE will be selected based on known or anticipated physical hazards; types and concentrations of contaminants that may be encountered on site; and contaminant properties, toxicity, exposure routes, and matrices. The following sections describe protective equipment and clothing; reassessment of protection levels; limitations of protective clothing; and respirator selection, use, and maintenance.

6.1 PROTECTIVE EQUIPMENT AND CLOTHING

Personnel will wear protective equipment when (1) site activities involve known or suspected contamination; (2) site activities may generate asbestos particulates; or (3) direct contact with hazardous materials may occur. The anticipated levels of protection selected for use by field personnel during site activities are listed in Table 4-2, Task Hazard Analysis. Based on the anticipated hazard level, personnel will initially perform field tasks in level D protection, described below.

If site conditions or the results of air monitoring during on-site activities warrant a higher level of protection, field personnel will immediately notify the Tetra Tech SSC. Based on the initial site walk-

through and conditions encountered during sample collection, a PPE upgrade to level C protection is anticipated in some of the areas to be sampled. This PPE upgrade will typically occur whenever vermiculite-containing insulation (VCI) or Libby vermiculite (LV) is encountered. Equipment and clothing required for level D and level C protection are described below.

- Level D
  - Disposable Coveralls (such as Tyvek or Polypropylene coveralls)
  - Disposable gloves (latex or vinyl), if applicable
  - Work gloves, if applicable
  - Boots with steel-toe protection and steel shanks
  - Disposable boot covers
  - Safety glasses or goggles
  - Hard hat (face shield optional)
  - Hearing protection (for areas with a noise level that exceeds 85 decibels on the A-weighted scale)
- Level C
  - Disposable Coveralls (such as Tyvek or Polypropylene coveralls)
  - Outer gloves (neoprene, nitrile, or other), if applicable
  - Disposable inner gloves (latex or vinyl)
  - Boots with steel-toe protection and steel shanks
  - Disposable boot covers
  - Full- or half-face, air-purifying respirator with National Institute for Occupational Safety and Health (NIOSH)-approved cartridges to protect against organic vapors, dust, fumes, and mists. (Cartridges used for gas and vapors must be replaced in accordance with the change-out schedule described in the Respiratory Hazard Assessment form [Form RP-2] in Appendix C.) P-100 cartridges will be used.
  - Safety glasses or goggles (with a half-face respirator only)
  - Hard hat (face shield optional)
  - Hearing protection (for areas with a noise level that exceeds 85 decibels on the A-weighted scale)

6.2 REASSESSMENT OF PROTECTION LEVELS

PPE levels will be upgraded or downgraded based on a change in site conditions or findings of the investigation. Hazards will be reassessed when a significant change in site conditions occurs. Some indicators of the need for reassessment are as follows:

- Commencement of a new phase of work, such as the start of a significantly different sampling activity or work that begins on a different portion of the site
- Potential for release of amphibole asbestos
- A change in tasks during a work phase
- A change of season or weather
- Temperature extremes or individual medical considerations that would limit the effectiveness of PPE
- Discovery of contaminants other than were previously identified
- A change in ambient levels of airborne contaminants (see the action levels listed in Table 8-1)
- A change in work scope that affects the degree of contact with contaminated media

6.3 LIMITATIONS OF PROTECTIVE CLOTHING

PPE clothing ensembles designated for use during site activities have been selected to protect against contaminants at known or anticipated on-site concentrations and physical states. However, no protective garment, glove, or boot is entirely chemical-resistant, nor does any protective clothing protect against all types of chemicals. Permeation of a chemical through PPE depends on the contaminant concentration, environmental conditions, the physical condition of the protective garment, and the resistance of the garment to the specific contaminant. Chemical permeation may continue even after the source of contamination has been removed from the garment. The Tetra Tech field staff will be trained to avoid property areas where chemical hazards are present; therefore, the use of chemical resistant PPE is not anticipated.

All site personnel will use the following procedures to obtain optimum performance from PPE.

- When protective coveralls become contaminated, don a new, clean garment after each rest break or immediately after sampling is completed.

- Inspect all clothing, gloves, and boots both before and during use for the following:
  - Imperfect seams
  - Non-uniform coatings
  - Tears
  - Poorly functioning closures
- Inspect reusable garments, boots, and gloves both before and during use for visible signs of chemical permeation, such as the following:
  - Swelling
  - Discoloration
  - Stiffness
  - Brittleness
  - Cracks
  - Punctures
  - Abrasions

Reusable gloves, boots, or coveralls that exhibit any of the characteristics listed above must be discarded. Reusable PPE will be decontaminated in accordance with procedures described in Section 10.0 and will be neatly stored in the support zone away from work zones.

6.4 RESPIRATOR SELECTION, USE, AND MAINTENANCE

Tetra Tech personnel will be informed of the proper use, maintenance, and limitations of respirators during annual health and safety refresher training and the pre-work briefing. Any on-site personnel who will use a tight-fitting respirator must pass a qualitative fit test for the respirator that follows the fit testing protocol provided in Appendix A of the OSHA respirator standard (29 CFR 1910.134). Fit testing must be repeated annually or when a new type of respirator is used. If exposure to asbestos on this project is expected to exceed 10 times the OSHA PEL, a quantitative respirator fit-test must be performed for all employees wearing respirators.

Respirators are selected based on the assessment of the nature and extent of hazardous atmospheres anticipated during field activities. This assessment includes a reasonable estimate of employee exposure to respiratory hazards and identification of each contaminant's anticipated chemical form and physical state.

A respiratory hazard assessment has been conducted for each task that will require use of a respirator during the TAPE project. The results of this assessment are documented in the Respiratory Hazard Assessment form (Form RP-2), which has been approved by the HSR. The completed Form RP-2 is included in Appendix C and defines respiratory protection requirements for the project. Amendments to this HASP and to Form RP-2 will be discussed during daily tailgate safety meetings.

When the atmospheric contaminant is identified and its concentration is known or can be reasonably estimated, respiratory protection options include the following:

- An atmosphere-supplying respirator (air-line or SCBA)
- An air-purifying respirator equipped with a NIOSH-certified, end-of-service-life indicator (ESLI) for the identified contaminant. If no ESLI is available, a change-out schedule for cartridges must be developed based on objective data or information. The HSR will evaluate respirator cartridge selection and change-out schedules during the respiratory hazard assessment. The Respiratory Hazard Assessment, Form RP-2, will describe the information and data used as the basis for the cartridge change-out schedule and the proposed change schedule.

For protection against particulate contaminants including friable asbestos, approved respirators can include the following:

- An atmosphere-supplying respirator
- A respirator equipped with a filter certified by NIOSH under 32 CFR Part 11 or 42 CFR Part 84 as a P100 filter (formerly known as a high-efficiency particulate air [HEPA] filter)

A full- or half-face, air-purifying respirator equipped with NIOSH-approved cartridges or filters will be selected to protect against particulates, vapors, gases, and aerosols for any tasks performed in level C PPE.

Air-purifying respirators will be used only in conjunction with breathing-space air monitoring, which must be conducted in adherence to the action levels outlined in Table 8-1. Air-purifying respirators will be used only when they can protect against the substances encountered on site.

Factors that would preclude use of level C and air-purifying respirators are as follows:

- Oxygen-deficient atmosphere (less than 19.5 percent oxygen)
- Concentrations of substances that may be immediately dangerous to life and health

- Confined or unventilated areas that may contain airborne contaminants not yet characterized
- Unknown contaminant concentrations or concentrations that may exceed the maximum use levels for designated cartridges documented in the selected cartridge manufacturer's instructions
- Unidentified contaminants
- High relative humidity (more than 85 percent, which reduces the sorbent life of the cartridges)
- Respirator cartridges with an undetermined service life

Use, cleaning, and maintenance of respirators are described in SWP 6-27, Respirator Cleaning Procedures, and SWP 6-28, Safe Work Practices for Use of Respirators. These SWPs are included in Appendix B.

7.0 MEDICAL SURVEILLANCE

The following sections describe Tetra Tech's medical surveillance program, including health monitoring requirements, site-specific medical monitoring, and medical support and follow-up requirements. Procedures documented in these sections will be followed for all activities during the TAPE project. Additional requirements are defined in the Tetra Tech, Inc., "Health and Safety Manual."

7.1 HEALTH MONITORING REQUIREMENTS

All Tetra Tech and subcontractor personnel involved in on-site activities for the TAPE project must participate in a health monitoring program as required by 29 CFR 1910.120(f). Tetra Tech has established a health monitoring program with WorkCare, Inc., of Orange, California. Under this program, Tetra Tech personnel working on this project will receive baseline and annual physical examinations consisting of the following:

- Complete medical and work history
- Physical examination
- Vision screening
- Audiometric screening

- Pulmonary function test
- Resting electrocardiogram
- Chest x-ray (required once every 3 years)
- Blood chemistry, including hematology and serum
- Urinalysis
- For sampling asbestos licensed workers will meet the medical monitoring requirements of their licenses

Tetra Tech receives a copy of the examining physician's written opinion for each employee after post-examination laboratory tests have been completed; the Tetra Tech employee also receives a copy of the written opinion. This opinion includes the following information (in accordance with 29 CFR 1910.120[f][7]):

- The results of the medical examination and tests
- The physician's opinion as to whether the employee has any medical conditions that would place the employee at an increased risk of health impairment from work involving hazardous waste operations or during an emergency response
- The physician's recommended limitations, if any, on the employee's assigned work; special emphasis is placed on fitness for duty, including the ability to wear any required PPE under conditions expected on site (for example, temperature extremes)
- A statement that the employee has been informed by the physician of the medical examination results and of any medical conditions that require further examination or treatment

All subcontractors must have health monitoring programs conducted by their own clinics in compliance with 29 CFR 1910.120(f) and 29 CFR 1910.1001. Any visitors or observers at the site will be required to provide records in compliance with 29 CFR 1910.120(f) before they can enter the site.

7.2 MEDICAL SUPPORT AND FOLLOW-UP REQUIREMENTS

All employees are entitled to and encouraged to seek medical attention and physical testing as a follow-up to an injury that requires care beyond basic first aid or to possible exposure above established exposure limits. These injuries and exposures must be reported to the HSR. Depending on the type of injury or exposure, follow-up testing, if required, must occur within 24 to 48 hours of the incident. It will be the responsibility of the employer's medical consultant to advise the type of test required to accurately

monitor for exposure effects. The Tetra Tech SSC must complete the Incident Investigation Report (Form IR in Appendix A) in the event of an accident, illness, or injury. A copy of this form must be forwarded to the HSR for use in determining whether the incident should be recorded and to be included in Tetra Tech's medical surveillance records.

8.0 ENVIRONMENTAL MONITORING AND SAMPLING

Environmental monitoring or sampling will be conducted to assess personnel exposure levels as well as site or ambient conditions and to establish appropriate levels of PPE. The following sections discuss initial and background air monitoring, personal monitoring, ambient air monitoring, monitoring parameters and devices, use and maintenance of survey equipment, thermal stress monitoring, and noise monitoring. Site-specific air monitoring requirements and action levels are provided in Table 8-1.

8.1 INITIAL AND BACKGROUND AIR MONITORING

Initial air monitoring of a typical work area will be performed at the beginning of the field sampling project to document airborne fiber levels in attic spaces, the Troy public information center and field office, and the interior of some houses that contain VCI or LV. These background samples, designated as "stationary samples" in the TAPE, are designed to provide baseline data at the beginning of the TAPE and health and safety quality assurance periodically during the process. Background micro-vacuum samples will also be collected inside Tetra Tech's rental vehicles at the beginning of the project, monthly during the project, and prior to returning the vehicles.

Initial exposure assessments will also be required for personnel who participate in the TAPE project. Personal air monitoring will be required during the initial phase of the TAPE to document airborne exposures. The assessments must be used to document typical exposures during specific types of field activities to establish the PPE level required during these activities.

TABLE 8-1

SITE-SPECIFIC AIR MONITORING REQUIREMENTS AND ACTION LEVELS

Contaminant or Hazard	Task	Monitoring Device	Action Level	Monitoring Frequency	Action[a]
Asbestos	Tasks 1 and 2	Gilair-5 Air Sampler (personal)	<one half of PEL or TLV	Select locations – presence of friable asbestos	Results will be received the day after sampling. Work practices will be changed accordingly.

Notes:

< Less than
PEL Permissible exposure limit
TLV Threshold limit value
[a] Refer to Table 4-2 for specific types of gloves, chemical resistant clothing, respirators, and cartridges

This exposure assessment will be conducted for each two-person field sampling team. The exposure levels must be documented before the levels of PPE required during the work can be downgraded. The assessments must also be conducted using personal air sampling whenever there is a change in working conditions or tasks being performed.

8.2 PERSONAL MONITORING

The employees working closest to a source of contamination have the highest likelihood of exposure to airborne contaminant concentrations that may exceed established exposure limits. Therefore, the workers who are closest to a source of contaminant generation will be selectively monitored during site activities. Personal monitoring will be conducted in the breathing zone and, if a worker is wearing respiratory protective equipment, outside the face piece. The breathing zone air will be monitored for Tetra Tech employees working at select locations, such as in the presence of friable asbestos. Work that results in potential employee exposure to airborne asbestos above the prescribed permissible exposure limit (PEL) or short term exposure limit (STEL) requires an exposure assessment regulated under the OSHA reference method 29 CFR Part 1910.1001. The determinations of employee exposure will be made from breathing zone air samples representative of the 8-hour TWA and 30-minute STEL for each employee work category. The PEL is 0.1 f/cc for the 8-hour TWA, and the STEL is 1.0 f/cc over a 30-minute period as set forth in 29 CFR Part 1910.1001 (j)(2)(iii).

Many activities anticipated during the TAPE may cause exposure of workers to LA. These activities include Task 1 and 2 procedures. If sampling or disturbance of these materials occurs by duly trained employees, initial air monitoring will be required since such activities could constitute asbestos disturbance procedures as defined by 29 CFR Part 1926.1101. The initial exposure assessments will be representative of each specific work situation at hand. Factors to be weighed include (but are not limited to) type of work, condition of the materials, air monitoring results from similar tasks, and all elements that could make the work more difficult (such as obstructions, high temperature areas, and poor reach areas). Tetra Tech anticipates collecting initial exposure assessment samples for each employee job category for each project team. Exposure assessment samples will also be collected on new field team members that rotate into the project over the course of the TAPE. Exposure assessment samples will also be collected periodically during the course of the TAPE as part of Tetra Tech's QA/QC process.

Tetra Tech initial exposure assessments will be designed to provide negative exposure assessments (NEAs) to demonstrate that employee exposures will be below the PEL or STEL for each representative

TAPE tasks. The monitoring and analysis will be performed in compliance with the OSHA asbestos standard in effect. The negative exposure assessment can be used in the initial exposure assessment to reduce or eliminate the need for respiratory protection if all applicable criteria are met.

Air monitoring will be performed to calculate the airborne fiber concentration to ensure that employee exposure remains below the PEL and STEL The worker's exposure will be measured by first collecting an air sample from within the breathing zone (within 12 inches from the nose) throughout an entire work-shift. This measurement usually necessitates that workers wear the pump near the waist. The personal air monitoring will be evaluated based on the different work activities that are being conducted. A representative set of air samples will be collected during activities that represent typical field days during the TAPE.

The sampling pump flow rates will be between 0.5 liters/minute and 2.5 liters/minute when using a 25-millimeter cassette. Once this sample is analyzed, the results shall be used to calculate the average level of exposure during the complete workshift (the time weighted average, TWA). The TWA is calculated as follows:

$$TWA = \frac{C1\ T1 + C2\ T2 + C3\ T3}{T1 + T2 + T3}$$

T = sample times (duration of exposure in minutes or hours)
C = airborne asbestos fiber concentration (in fibers per cubic centimeter, f/cc)

The TWA results will then be used for comparison to the PEL and to evaluate compliance with permissible exposure limits as established by OSHA. They will also be used to dictate which type of respiratory protection is required to ensure that the PEL is not exceeded.

Personal air samples will also be collected and analyzed in the manner described above for comparison to the PEL and STEL. Sample filters will be analyzed using PCM methodology by laboratory personnel (1) trained in NIOSH 582 microscopist (or equivalent) courses and (2) participating in a quality control program meeting the requirements established in 29 CFR 1926.1101. The NIOSH method used for this analysis will be Method 7400. The PCM analytical method is designed to identify all fibers of specific size and shape characteristics but not to distinguish between asbestos and non-asbestos fibers. PCM sample results are reported in fibers per cubic centimeter of air (f/cc). Tetra Tech will request that all sample filters be returned from the laboratory after analysis to be archived. Tetra Tech will utilize one of several laboratories for analysis. These will include: 1) Betta Environmental Associates, Inc. in Newark,

Delaware; 2) EMSL Analytical, Inc. in Westmond, New Jersey; 3) EMSL Analytical, Inc. in Libby, Montana; 4) Hygeia Laboratories, Inc. in Sierra Madre, California;5) MAS in Suwannee, Georgia; and 6) Reservoirs Environmental, Inc. in Denver, Colorado. All of these laboratories are accredited though the National Voluntary Laboratory Accreditation Program (NVLAP).

8.3 MONITORING PARAMETERS AND DEVICES

The following sections below briefly describe the use and limitations of instruments used to monitor for asbestos, combustible atmospheres, percent oxygen, and particulates. Site-specific air monitoring requirements and action levels are listed in Table 8-1.

All monitors will be calibrated in accordance with manufacturer recommendations prior to and subsequent to use for sampling purposes (pre-and post-calibration). Pre and post-calibration results will be averaged to determine the average flow-rate being drawn through the pump for a particular sampling period. Calibration data and other pertinent air monitoring data will be recorded in the field logbook.

8.3.1 Asbestos

Air monitoring will be conducted selectively during sampling to provide information on exposure and identify the need for upgrades from level D PPE to level C PPE. In addition, air monitoring will be conducted to make certain that asbestos is not being released to the areas used by workers as a result of sampling.

Work during the TAPE will be initially conducted in level C PPE; however, after negative exposure assessments are documented, level D will be allowed for exterior soil sampling procedures if no visible VCI or LV is present. Level C PPE will be required whenever attic access is required or whenever VCI or LV is sampled. The action level (the level at which PPE will be upgraded from Level D to Level C) for sampling activities is one-half the PEL (0.05 f/cc). Additionally, upgrade to level C PPE will also be based on the material sampled and at the discretion of the SSC. Personal air monitoring for particulates will be analyzed by laboratories accredited though the NVLAP. Laboratory results will be received less than 1 day after actual exposure to assist assessing sampling conditions and change PPE accordingly.

8.3.2 Particulates

Friable asbestos is anticipated to be encountered during sampling. Other particulates, such as mineral wood, fiberglass, and other insulating materials, may be encountered in attic areas but are not known.

Particulate air monitoring is the process of measuring the fiber content of a known volume of air collected during a specific period of time. The acceptable procedure for airborne asbestos measurement for personal exposure monitoring is phase-contrast microscopy (PCM) using the OSHA reference method specified in Appendix A of 29 CFR 1926.1101. NIOSH Method 7400 is an equivalent and acceptable method for measuring airborne fiber levels in area samples. The NIOSH method will be used for initial employee exposure monitoring. The standard detection limit is <0.01 fiber/cc. If lower levels are detection are required, the sample volume and collection time period should be increased. Adjustments to sample volume and time should be selected so that a fiber density of between 100 to 1,300 fibers/mm^2 is obtained.

In both sampling methods above, any fiber with an aspect ratio (measure of length vs. width) of greater than 3 to 1 is counted as an asbestos fiber. In areas with significant amounts of fibers such as fiberglass, the PCM method may overestimate the number of asbestos fibers in the air, and thus the exposure to employees. In this circumstance, a more selective method of asbestos identification will be employed, explained below.

The acceptable procedure for airborne asbestos measurement by transmission electron microscopy (TEM) is the method EPA specified in 40 CFR 763, Appendix A to Subpart E, Interim Transmission Electron Microscopy Analytical Methods. NIOSH method 7402 is the equivalent TEM method to 40 CFR 763, Appendix A to Subpart E. TEM sampling provides greater analytical sensitivity and can differentiate between asbestos and non-asbestos fibers. TEM analysis of employee exposure samples will be limited during the TAPE, only being conducted if PCM samples cannot be analyzed due to overloading from nuisance particulates, or when fibers must be differentiated because the PEL is exceeded. If such occurrences arise, samples may be reanalyzed by TEM using NIOSH Method 7402.

8.4 USE AND MAINTENANCE OF SURVEY EQUIPMENT

All personnel using field survey equipment must have experience or training in its operation, limitations, and maintenance. Maintenance and internal or electronic calibration will be performed in accordance with manufacturer recommendations by personnel who are familiar with the devices before they are used on site. Repairs, maintenance, and internal or electronic calibration of these devices will be recorded in an equipment maintenance logbook. Results of routine calibration will be recorded on daily air sampling data sheets.

8.5 THERMAL STRESS MONITORING

Heat stress and cold stress are common and serious threats at hazardous waste sites. SWPs 6-15 and 6-16 discuss heat and cold stress and include monitoring methods appropriate for the season and location of work (see Appendix B).

9.0 SITE CONTROL

Site control is an essential component in HASP implementation. The following sections discuss measures and procedures for site control, such as on-site communications, site control zones, site access control, site safety inspections, and SWPs.

9.1 ON-SITE COMMUNICATIONS

Successful communication between field teams and personnel is essential. The following communication systems will be available during site activities:

- Cellular telephones or two-way radios

The hand signals listed below will be used by site personnel in emergency situations or when verbal communication is difficult.

Signal	Definition
Hands clutching throat	Out of air or cannot breathe

Signal	Definition
Hands on top of head	Need assistance
Thumbs up	Okay, I am all right, or I understand
Thumbs down	No or negative
Arms waving upright	Send backup support
Gripping partner's wrist	Exit area immediately

9.2 SITE CONTROL ZONES

The following site control zones will be established for each property and work task.

9.2.1 Zone 1: Exclusion Zone

An exclusion zone includes areas where contamination is either known or likely to be present or, because of work activity, has the potential to cause harm to personnel. Typically, these areas will be limited to attics and crawl spaces during the TAPE. The exclusion zone will be established before Tetra Tech employees access attic areas or crawl spaces to collect samples. Other building occupants and visitors will be restricted from entering the exclusion zone during sampling procedures by the Tetra Tech field team working in the area. Work tasks that may require establishment of an exclusion zone include the following:

Task 1– Interior inspection of VCI and LV in attics and crawl spaces.

Exclusion zones will not be established during collection of dust samples within other interior areas of buildings or during collection of soil samples outside the buildings. However, building occupants should be restricted from the immediate area during sampling procedures.

9.2.2 Zone 2: Decontamination Zone

Decontamination zones will be established during the TAPE project, such as at the base of ladders used to access attic spaces or outside of crawl space entrances. These areas will be covered with one layer of polyethylene sheeting during sampling in the exclusion zones. Personal decontamination will entail

removing of protective garments after field crews descend from attic areas or exit crawl spaces. Tetra Tech personnel will use disposable wet wipes to wash respirators and exposed areas such as faces and hands. Sampling equipment will be decontaminated at the sample locations. Decontamination procedures will consist of a water rinse or damp rag cleaning of equipment after each sample collected. The decontamination zone will contain facilities to decontaminate personnel and portable equipment. Equipment decontamination procedures are described in Section 10.0. All PPE and polyethylene sheeting will be place in disposal bags and sealed before Tetra Tech employees exit the decontamination zones. After personal and equipment decontamination are complete and polyethylene sheeting removed, decontamination areas will be cleaned of debris and residue using appropriate HEPA vacuuming or wet cleaning procedures. Visitors, including building occupants, will not be permitted to enter the decontamination zone without proper qualifications and Tetra Tech SSC authorization.

9.2.3 Zone 3: Support Zone

A support zone may consist of any uncontaminated and non-hazardous part of the site, such as areas adjacent to decontamination zones at the base of ladders used to access attic spaces or outside of crawl space entrances. Sampling procedures will immediately stop if visible suspect asbestos-contaminated debris is observed outside of the sampling or decontamination areas at any time during sampling after the exclusion zone has been established. Debris and residue will be cleaned up using appropriate HEPA vacuuming or wet cleaning procedures before work recommences. Site visitors who do not meet training, medical surveillance and PPE requirements may enter the support zone upon approval by the Tetra Tech SSC unless visible suspect asbestos-contaminated debris is observed in the area.

9.3 SITE ACCESS CONTROL

The study area during this project will not be one stationary location. Access to private residences will be permitted by the owner. Owners and occupants should be restricted from the immediate areas during sampling procedures. Typically, they should be asked to stay in adjacent rooms during sampling procedures.

9.4 SITE SAFETY INSPECTIONS

The Tetra Tech SSC will conduct one site safety inspection for each month spent on-site to maintain safe work areas and compliance with this HASP. Results of the site safety inspections will be recorded on a Field Audit Checklist (Form AF-1 in Appendix A).

9.5 SAFE WORK PRACTICES

Various SWPs are applicable during the TAPE project. These SWPs are included in Appendix B to this HASP. The following SWPs apply to the site:

- SWP 6-1, General Safe Work Practices
- SWP 6-8, Safe Electrical Work Practices
- SWP 6-9, Fall Protection Practices
- SWP 6-10, Portable Ladder Safety
- SWP 6-15, Heat Stress
- SWP 6-16, Cold Stress
- SWP 6-27, Respirator Cleaning Procedures
- SWP 6-28, Safe Work Practices for Use of Respirators
- SWP 6-29, Respirator Qualitative Fit Testing Procedures

10.0 DECONTAMINATION

Decontamination is the process of removing or neutralizing contaminants on personnel or equipment. When properly conducted, decontamination procedures protect workers from contaminants that may have accumulated on PPE, tools, rental vehicles and other equipment. Proper decontamination also prevents transport of potentially harmful materials to uncontaminated areas. Personnel and equipment decontamination procedures are described in the following sections.

10.1 PERSONNEL DECONTAMINATION

Personnel decontamination at the site will be limited by using disposable PPE whenever possible and by wet wiping of faces and hands after sampling procedures. Any personnel decontamination procedures will follow guidance in the *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities* (NIOSH and others 1985). Personnel and PPE will be decontaminated with potable water or a mixture of detergent and water. Disposable cloths or wet wipes will be placed in sealable baggies pending disposal.

10.2 EQUIPMENT DECONTAMINATION

Decontamination of all sampling, PPE, and field monitoring equipment used during site activities will be required. Decontamination of sampling equipment will be conducted at the sample locations. Decontamination procedures will consist of a water rinse or damp rag cleaning of equipment after each sample collected. As part of Tetra Tech quality assurance and general health and safety procedures, the interior of all rental vehicles will also be HEPA vacuumed wet wiped bi-monthly to ensure cleanliness.

10.2.1 PPE and Monitoring Equipment

Used, disposable PPE will be collected in sealable containers and will be disposed of in accordance with procedures described in the project specific work plan. Personnel decontamination procedures may be modified as necessary while on site. All non-disposable PPE such as hard hats, respirators, and any exposed clothing will be washed at the end of each workday, or as necessary depending on working conditions, to remove all potential for asbestos contamination. Monitoring equipment used during sampling will be rinsed with water at the end of each workday, or as necessary to remove any contamination.

10.2.2 Sampling Equipment

Sampling equipment, such as stainless steel mixing bowls and dust sampling templates will be decontaminated before and after each use as described below.

- Decontamination procedures for sampling equipment will depend on the sampling location. Equipment will, in most sampling situations, be decontaminated by wiping down with damp cloths or rags. Soap and water may be necessary when items are excessively dirty but are not mandatory.

- Sampling equipment will be wiped down with disposable paper towels or be allowed to air-dry before the next use.

11.0 EMERGENCY RESPONSE PLANNING

This section describes emergency response planning procedures to be implemented for the site. This section is consistent with local, state, and federal disaster and emergency management plans. The following sections discuss pre-emergency planning, personnel roles and lines of authority, emergency recognition and prevention, evacuation routes and procedures, emergency contacts and notifications, hospital route directions, emergency medical treatment procedures, protective equipment failure, fire or explosion, weather-related emergencies, spills or leaks, emergency equipment and facilities, and reporting.

11.1 PRE-EMERGENCY PLANNING

All on-site employees will be trained in and reminded of the provisions of Section 11.0, site communication systems, and site evacuation routes during the pre-work briefing and daily tailgate safety meetings. The Tetra Tech SSC will review the emergency response provisions on a regular basis and will be revised, if necessary, to make certain that they are adequate and consistent with prevailing site conditions.

11.2 PERSONNEL ROLES AND LINES OF AUTHORITY

The Tetra Tech SSC has primary responsibility for responding to and correcting emergencies and for taking appropriate measures to maintain the safety of site personnel and the public. Possible actions may include evacuation of personnel from the site area. The SSC is also responsible for ensuring that corrective measures have been implemented, appropriate authorities have been notified, and follow-up reports have been completed.

Individual subcontractors are required to cooperate with the SSC, within the parameters of their scopes of work.

Personnel are required to report all injuries, illnesses, spills, fires, and property damage to the SSC immediately. The SSC must be notified of any on-site emergencies and is responsible for following the appropriate emergency procedures described in this section.

11.3 EMERGENCY RECOGNITION AND PREVENTION

Table 4-1 lists potential on-site chemical hazards, and Table 4-2 provides information on the hazards associated with the various tasks planned for the site. On-site personnel will be made familiar with this information and with techniques of hazard recognition through pre-work training and site-specific briefings.

11.4 EVACUATION ROUTES AND PROCEDURES

In the event of an emergency that necessitates evacuation of a work task area or the site, the Tetra Tech SSC will contact all nearby personnel using the on-site communication systems discussed in Section 9.1 to advise the personnel of the emergency. The personnel will proceed along site roads to a safe distance upwind from the source of the hazard. The personnel will remain in that area until the SSC or an authorized individual provides further instructions.

11.5 EMERGENCY CONTACTS AND NOTIFICATIONS

The emergency information before Section 1.0 of this HASP provides names and telephone numbers of emergency contact personnel. This page must be posted on site or must be readily available at all times. In the event of a medical emergency, personnel will notify the appropriate emergency organization and will take direction from the Tetra Tech SSC. The project team will follow procedures discussed in Section 11.9 or 11.11.

11.6 HOSPITAL ROUTE DIRECTIONS

Before site activities begin, Tetra Tech personnel will conduct a pre-emergency hospital run to familiarize themselves with the route to the local hospital. A map showing the hospital route is provided in the emergency information before Section 1.0 of this HASP.

11.7 EMERGENCY MEDICAL TREATMENT PROCEDURES

A person who becomes ill or injured during work may require decontamination. If the illness or injury is minor, any decontamination necessary will be completed and first aid should be administered before the patient is transported. If the patient's condition is serious, partial decontamination will be completed (such as complete disrobing of the person and redressing the person in clean coveralls or wrapping in a blanket). First aid should be administered until an ambulance or paramedics arrive. All injuries and illnesses must be reported immediately to the Tetra Tech project manager and HSR.

11.8 PROTECTIVE EQUIPMENT FAILURE

If any worker in the exclusion zone experiences a failure of protective equipment (either engineering controls or PPE) that affects his or her personal protection, the worker and all coworkers will immediately leave the exclusion zone. Re-entry to the exclusion zone will not be permitted until (1) the protective equipment has been repaired or replaced, (2) the cause of the equipment failure has been determined, and (3) the equipment failure is no longer considered to be a threat.

11.9 FIRE OR EXPLOSION

In the event of a fire or explosion on site, fire department will be immediately summoned. The Tetra Tech SSC or a site representative will advise the fire department of the location and nature of any hazardous materials involved. Appropriate provisions of Section 11.0 will be implemented by site personnel.

11.10 WEATHER-RELATED EMERGENCIES

Work will not be conducted during severe weather conditions, including high-speed winds or lightning. In the event of severe weather, field personnel will stop work, secure and lower all equipment, and leave the site.

Thermal stress caused by excessive heat or cold may occur as a result of extreme temperatures, workload, or the PPE used. Heat and cold stress treatment will be administered as described in SWPs 6-15 and 6-16.

11.11 EMERGENCY EQUIPMENT AND FACILITIES

The following emergency equipment will be available on site:

- First aid kit
- Fire extinguisher
- Site telephones, depending on location
- Mobile telephone
- Confined-space entry equipment, as necessary
- Fall protection equipment, as necessary

11.12 REPORTING

All emergencies require follow-up and reporting. Appendix A includes the Tetra Tech Incident Report (Form IR). This report must be completed and submitted to the Tetra Tech project manager within 24 hours of an emergency. The project manager will review the report and then forward it to the Tetra Tech HSR for review. The report must include proposed actions to prevent similar incidents from occurring. The HSR must be fully informed of the corrective action process so that he may implement applicable elements of the process at other sites.

REFERENCES

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